Cuk-H03842-32-P003673

010.5
AS52 Proc

Aslib Proceedings

32

VOLUME 35
1983

Aslib
3 BELGRAVE SQUARE LONDON SW1

P3673

Printed in Great Britain by Unwin Brothers Ltd., The Gresham Press,
Old Woking, Surrey

CONTENTS

55TH ASLIB ANNUAL CONFERENCE: University of Manchester INFORMATION TECHNOLOGY: PRACTICE, POTENTIAL, LIMITATIONS AND EFFECTS ON THE PROFESSION

The future of information technology: a personal view F. H. SUMNER 1

Session 1: Reviewing the information technology: What's here and just around the corner — demonstrations

Computer-controlled LV systems PAUL BRADLEY 14
The 8000 Network System and the 8010 Professional Works Station JOHN BROOK 15
TV microform/microfiche systems HOWARD COHEN 19
Converging technologies: the Teleputer terminal MIKE McCORMAC 24
New office systems technology R. F. GLYN-JONES 31

Session 2: Information technology in practice: limitations and potential

On being automated HAZEL DOWNING 38
Information technology — here and now benefits MICHAEL ASTON 52
Discussion 59

Session 3: Communications: availability, politics and cost

British Telecom and the communications industry after Beesley F. LAWSON 61
Information and satellite technology R. MORRIS 71
Electronic journals and the communication of research B. SHACKEL *and* D. J. PULLINGER 77

Session 4: What technology is doing to information practice and people

The impact of new technology on the information profession M. A. SIMKINS 92
Technological change and professional education: fundamental problems in curriculum development for the future KEVIN McGARRY 99
Discussion 107
The role of the professional organisation D. A. LEWIS 108
Discussion 121

An aid to calculating search costs online N. R. SMITH 123
Prestel in a medical school library: the experience of the Welsh National School of Medicine ANNE BELL 132
Information service models: some opinions, some choices BILL BLAKE 138
Measuring a library P. G. PEACOCK 152
Setting up a 'One Man Band' library in a commercial environment A. M. J. PERROTT 156
Letter to the Editor 164

NEW APPROACHES TO DOCUMENT DELIVERY: SYSTEMS, SERVICES AND THEIR IMPLICATIONS

Aslib one-day conference, London, 22 November 1982

Document delivery, now and in the future MAURICE B. LINE 167
Project Hermes D. M. YATES 177
Document delivery services and copyright GILLIAN E. BULL 183
User needs and technology options for electronic document delivery YURI GATES 195
Discussion 204
Letter to the Editor 205

Interlending strategy for the future STUART EDE 207
Meanwhile in West Germany . . . BLAISE CRONIN 213
Some thoughts on the provision of courses in reading for industry IAN F. FINDLAY 222
Online library catalogue — offline public access DAVID BUCKLE 227
A Future for Printed Indexes? JENNIFER E. ROWLEY 234
Quality control in online databases RALPH GEE 239
An investigation into the applicability of *Science Citation Index* as a tool to measure the usefulness of publications of the International Tin Research Institute GILL CROFT 249
Three specialised data centres JOHN MARTYN 258
Adaption, extinction or genetic drift? BLAISE CRONIN 278
Monitoring the demand for the service of academic libraries — interpreting survey evidence SAXON BRETTELL *and* JIM BASKER 290
Aslib Microfilm Service MARY ANN COLYER 297

EXPLOITING PRIVATE VIEWDATA

Aslib one-day seminar, London, 13 April 1983

Types of application in private viewdata and their potential for the information/library field ROBIN YEATES 303
The TOPIC system at The Stock Exchange ALAN CURRIE 306
Club 403 — the DoI's test market for public residential viewdata service ROY GRANT 308
PVS-990 videotex information distribution and data entry system GAVIN LESLIE 311
Designing a viewdata system PETER LINTON 312
Graphics and presentation: if this is the shape of things to come, why does it look so nasty? IAN McLAREN 319
The management of viewdata ROBIN CLOUGH 325

ACCESS TO INFORMATION: TOWARDS 1984

Aslib Northern and Midlands Branches Joint Annual Conference, Kendal, 17–19 March 1983

Software off the shelf: in-house information with a micro PAUL BURTON 335
External databases: an overview ALLAN FOSTER 346
Using a general purpose microcomputer for online searching D. M. NICHOLSON *and* J. H. PETRIE 354
Computerisation of an industrial department — The use of STATUS at Howarth Algraphy JIM HETHERINGTON 358
After PERLINE: one route to computerised housekeeping using PERLINE as a starting point F. A. GRAHAM 363
One way in: the alternative information scene DONALD W. LEE 367
Alternative information ANN LAWES 371
Finding out about women PAT DARTER 374

16TH ASLIB ANNUAL LECTURE

An exploration into the social and economic effects of information technology DONALD WRAY 379

Electronic publishing: a market perspective JOHN GURNSEY 389
Agdex — grass-roots information RUTH M. JOHNSON *and* MARILYN MULLAY 398
Non profit-marketing — libraries' future? CRYSTAL CONDOUS 407
Measuring the value and marketing the service: an approach to library benefit STUART HANNABUSS 419
Letter to the Editor 428

COPYRIGHT AND INFORMATION REPACKAGING: OLD PROBLEMS, NEW TECHNOLOGIES

Aslib Seminar, London, 22 June 1983

Interpretation of copyright law — looking especially at the situation created by the new technology DENIS DE FREITAS 431
'Public domain' software RAY TEMPLETON 440
Copyright and computer software: the publisher's view JOHN DAVIS 444
Photocopying and licensing: the publisher's view KENNETH PINNOCK 449
Reprography and copyright with particular reference to inter-library lending activities — a view from the BLLD D. N. WOOD 457

- 6 MAR 192[illegible]

[illegible] MAR [illegible]

ASLIB PROCEEDINGS

INDEX

010.5
AS 52 Proc.

Volume 35, 1983

INDEX

AUTHOR INDEX

Aston, Michael, 'Information technology—here and now benefits', 52–59.
Ayres, F. H., 'Identification of references', letter, 205.

Basker, Jim *and* Brettell, Saxon, 'Monitoring the demand for the services of academic libraries—interpreting survey evidence', 290–296.
Bell, Anne, 'Prestel in a medical school library: the experience of the Welsh National School of Medicine', 132–137.
Blake, Bill, 'Information service models: some opinions, some choices', 138–151.
Bradley, Paul, 'Computer-controlled LV systems', 14.
Brettell, Saxon *and* Basker, Jim, 'Monitoring the demand for the services of academic libraries—interpreting survey evidence', 290–296.
Brook, John, 'The 8000 Network System and the 8010 Professional Works Station', 15–18.
Buckle, David, 'Online library catalogue—offline public access', 227–233.
Bull, Gillian E., 'Document delivery services and copyright', 183–194.
Burton, Paul, 'Software off the shelf: in-house information with a micro', 335–345.

Clough, Robin, 'The management of viewdata', 325–330.
Cohen, Howard, 'TV microform/microfiche systems', 19–23.
Colyer, Mary Ann, 'Aslib Microfilm Service', 297–302.
Condous, Crystal, 'Non-profit marketing—libraries' future', 407–417.
Crennell, K. M., 'Publications of the Crystallographic Data Centre', letter, 428–430.
Croft, Gill, 'An investigation into the applicability of *Science Citation Index* as a tool to measure the usefulness of publications of the International Tin Research Institute', 249–257.
Cronin, Blaise, 'Adaption, extinction or genetic drift', 278–289.
Cronin, Blaise, 'Meanwhile in West Germany . . .', 213–221.
Currie, Alan, 'The TOPIC system at the Stock Exchange', 306–307.

Darter, Pat, 'Finding out about women', 374–377.
Davis, John, 'Copyright and computer software: the publisher's view', 444–448.
Dodd, W. P., Shackel, B., Pullinger, D. J. *and* Maud, T. I., 'Electronic journals and the communication of research', 77–91.
Downing, Hazel, 'On being automated', 38–51.

Ede, Stuart, 'Interlending strategy for the future', 207–212.

Finlay, Ian, F., 'Some thoughts on the provision of courses in reading', 222–227.
Foster, Allan, 'External databases: an overview', 346–353.
de Freitas, Denis, 'Interpretation of copyright law—looking especially at the situation created by the new technology', 431–439.

Gates, Yuri, 'User needs and technology options for electronic document delivery', 195–203.
Gee, Ralph, 'Quality control in online databases', 239–248.
Glyn-Jones, R. F., 'New office systems technology', 31–37.
Graham, F. A., 'After PERLINE: one route to computerised housekeeping using PERLINE as a starting point', 363–366.
Grant, Roy, 'Club 403—the DOI's test market for public residential viewdata service', 308–310.
Gurnsey, John, 'Electronic publishing: a market perspective', 389–397.

Hannabuss, Stuart, 'Measuring the value and marketing the service: an approach to library benefit', 418–427.
Hetherington, Jim, 'Computerisation of an industrial department—the use of STATUS at Howson Algraphy', 358–362.

Johnson, Ruth M. *and* Mullay, Marilyn, 'Agdex—grassroots information', 398–406.

Lawes, Ann, 'Alternative information', 371–373.
Lawson, F., 'British Telecom and the communications industry after Beesley', 61–70.
Lee, Donald W., 'One way in: the alternative information scene', 367–370.
Leslie, Gavin, 'PVS—990 videotex information distribution and data entry system', 311.
Lewis, D. A., 'The role of the professional organisation', 108–121.
Line, Maurice B., 'Document delivery, now and in the future', 167–176.
Linton, Peter, 'Designing a viewdata system', 312–318.

McCormac, Mike, 'Converging technologies: the Teleputer terminal', 24–30.
McGarry, Kevin, 'Technological change and professional education: fundamental problems in curriculum development for the future', 99–107.
McLaren, Ian, 'Graphics and presentation: if this is the shape of things to come, why does it look so nasty?', 319–324.
Martyn, John, 'Three specialised data centres', 258–277.
Maud, T. I., Shackel, B., Pullinger D. J. *and* Dodd, W. P., 'Electronic journals and the communication of research', 77–91.
Morris, R., 'Information and satellite technology', 71–76.
Mullay, Marilyn *and* Johnson, Ruth M., 'Agdex—grass-roots information', 398–406.

Nicholson, D. M. *and* Petrie, J. H., 'Using a general purpose microcomputer for online searching', 354–357.

Peacock, P. G., 'Measuring a library', 152–155.
Perrott, A. M. J., 'Setting up a "One Man Band" library in a commercial environment', 156–163.
Petrie, J. H. *and* Nicholson, D. M., 'Using a general purpose microcomputer for online searching', 354–357.
Pinnock, Kenneth, 'Photocopying and licensing: the publisher's view', 449–456.
Pullinger, D. J., Shackel, B., Maud, T. I. *and* Dodd, W. P., 'Electronic journals and the communication of research', 77–91.

Rowley, Jennifer E., 'A future for printed indexes?', 234–238.

Shackel, B., Pullinger, D. J., Maud, T. I. *and* Dodd, W. P., 'Electronic journals and the communication of research', 77–91.
Simkins, M. A., 'The impact of new technology on the information profession', 92–98.
Smith, N. R., 'An aid to calculating search costs online', 123–131.
Sumner, F. H., 'The future of information technology: a personal view', 1–13.

Templeton, Ray, ' "Public domain" software', 440–443.

Wood, D. N., 'Reprography and copyright with particular reference to inter-library lending activites—a view from the BLLD', 457–467.
Wray, Donald, 'An exploration into the social and economic effects of information technology', 379–388.

Yates, D. M., 'Project Hermes', 177–182.
Yeates, Robin, 'Types of application in private viewdata and their potential for the information/library field', 303–305.

SUBJECT INDEX

Academic libraries, demand for services, 290–296.
Agdex, 398–406.
Agricultural information, 398–406.
Aslib
  Annual Lecture, 379–388.
  future of, 108–121.
  Microfilm Service, 297–302.

Benefit, from information services, 418–427.
BLEND-LINC, 77–91.
British Library Lending Division, and copyright, 457–467.
British Telecom, 61–70.

Catalogues, union, automation of, 207–212.
Catalogues, online, 207–212, 227–233.
Citation analysis, 249–257.
Club 403, 308–310.
Commercial libraries, 156–163.
Communications satellites, 71–76.
Computer-aided instruction, 14.
Computerised information, *see* Online.
Computerised library housekeeping, 363–366.
Computer software, *see* Software.
Convergence of technologies, 24–30.
Copyright
  British Library Lending Division, 457–467.
  and document delivery, 183–194.
  and interlending, 457–467.
  law, 431–439.
  and new technology, 431–439.
  and photocopying, 449–456.
  and publishers, 444–448.
  and software, 440–443.
Costing model, online, 123–131.
Crystallographic Data Centre, 258–277, 428–430.
Curricula, and new technology, 99–106.

Database management systems, 31–37, 335–345.
Data centres, 258–277.
Demand for library services, 290–296.

Department of Industry, and viewdata, 308–310.
Document delivery systems, 167–204.
  and copyright, 183–194.
  future trends, 167–176.
  Hermes Project, 177–182.
  user needs, 195–203.

Education for information work, 99–106.
EISSWA Project, 138–151.
Electronic document delivery; *see* Document delivery systems.
Electronic journals, 77–91.
Electronic publishing, 167–204, 389–397.
Engineering Sciences Data Centre, 258–277.
Equal Opportunities Commission, information services, 374–377.
Evaluation of library services, 290–296, 418–427.

Germany, library developments, 213–221.
Graphics, on viewdata, 319–324.

Hermes, Project, 177–182.
Howson Algraphy, 358–362.

Indexes, printed, future of, 234–238.
Industry
  Information services, 358–362.
  Language skills, 222–227.
Information organisations, 108–120.
Information professions
  education for, 99–106.
  future of, 278–289.
  new technology and, 92–98.
Information retrieval software, 335–345, 358–362.
Information services
  agricultural, 398–406.
  alternative, 367–370, 371–373.
  benefit from, 418–427.
  industrial, 358–362.
  social services, 138–151.
  specialised, 258–277.
  on women, 374–377.
  et passim.
Information technology
  benefits, 52–59.
  convergence of, 24–30.
  copyright law, 431–439.
  education for information work, 99–106.
  future developments, 1–13.
  impact on information professions, 92–98.
  office technology, 31–37.
  satellites, 71–76.
  social/economic effects, 379–388.
  word processing, 38–51.
Intelligent systems, 14.
Interlibrary lending, 207–212.
  and copyright, 457–467.
International Tin Research Institute, 249–257.

Journals, electronic, 77–91.

Language skills, and industry, 222–227.
Laser Vision, 14.
Libraries
  academic, 290–296.
  commercial, 156–163.
  demand for, 290–296.
  Germany, 213–221.
  one-man bands, 156–163.
  simulation of, 152–155.
  et passim.
Licensing, *see* Copyright.
LINC, 77–91.

Marketing, library services for, 152–155.
Marketing of libraries, 407–417, 418–427.
Market research reports, 164.
Mass Spectrometry Data Centre, 258–277.
Measurement, of library services, 152–155.
Medical libraries, Prestel in, 132–137.
Microcomputers
  and online, 354–357.
  in libraries, 335–345.
Microfilm, at Aslib, 297–302.
Microform/microfiche systems, 19–23.
Model, costing, for online, 123–131.

OCLC, 227–233.
Office technology, 31–37.
'One-Man Band' library, 156–163.
Online
  agricultural information, 398–406.
  catalogues, 227–233.
  costs, 123–131.
  databases, 346–353.
  multiple references, 205.
  OCLC, 227–233.
  quality control, 239–248.
  searching, 354–357

PERLINE, 363–366.
Photocopying, and copyright, 449–456.
Prestel, in medical library, 132–137.
  see also Viewdata.
Private viewdata, *see* Viewdata, private.
Professional organisations, for information workers, 108–120.
Publishing
  and copyright, 444–448.
  electronic, 167–204, 389–397.
  evaluation of, 249–257.
PVS-990, videotex system, 311.

Quality control, online, 239–248.
Quantitative research, on libraries, 152–155.

Reading, training courses, 222–227.
References, online, 205.
Reprography, and copyright, 457–467.

Satellite technology, 71–76.

Science Citation Index, 249–257.
Shelf space, estimation of, 152–155.
Simulation, of library services, 152–155.
Social welfare information, 138–151.
Software
  and copyright, 440–443, 444–448.
  for information retrieval, 335–345, 358–362.
Specialised data centres, 258–277.
STATUS, 358–362.
Stock Exchange, and viewdata, 306–307.
Surveys, of library demand, 290–296.
System design, of viewdata, 312–318.

Telecommunications, 61–70, 71–76.
Telephone services, 61–70.
Teleputer, 24–30.
TOPIC, 306–307.
TV microform/microfiche systems, 19–23.

UKAEA libraries, 363–366.
UK Library Database System, 207–212.
Union catalogues, automated, 207–212, 227–233.
User needs for document delivery, 195–203.

Value, of library/information services, 418–427.
Videotex, 24–30, 132–137
  see also Viewdata.
Viewdata, private, 303–330.
  applications of, 303–305.
  Club 403, 308–310.
  design of, 312–318.
  graphics, 319–324.
  management of, 325–330.
  residential, 308–310.
  Stock Exchange, 306–307.
  system design, 312–318.
  TOPIC system, 306–307.

Welfare information, 138–151.
Welsh National School of Medicine, 132–137.
Women, information on, 374–377.
Word processing, 38–51.
Work, effects of technology, 38–51.

Xerox 8000 Network System, 15–18.
Xerox 8010 Professional Workstation, 15–18.

010.5
AS52 Proc

Aslib

Proceedings

VOL. 36 NUMBER 1 JANUARY 1984

56th ASLIB ANNUAL CONFERENCE

INFORMATION FOR NATIONAL RECOVERY: NEEDS—RESOURCES—TECHNOLOGY

Session 1: The competitive world: keeping up and keeping in touch

The Government's role: creating the right climate for the technological revolution 1
J. Allan Stewart

Information exchange in a North-South context: is there more to gain through co-operation than in trying to establish new markets? 7
John E. Woolston

European information policy situation 15
C. Jansen van Rosendaal

Information—the basis of Japan's forecast technological and economic development 24
Christian Galinski

Discussion 58

ISSN 0001-253X

ASLIB PROCEEDINGS

Volume 36 JANUARY Number 1

Aslib Proceedings carries papers given at Aslib meetings and conferences, and contributed papers of interest to practising professionals. These describe innovations in information management techniques, applications of existing information products and services, and case studies of information units and special libraries. The contents of the journal are reviewed by an editorial board.

Aslib Proceedings is published monthly and supplied free to members of Aslib. Annual subscriptions to non-members: £50 (UK)/£60 (overseas); additional subscription to members: £30/£35. Single copy prices and subscription information are available from the Subscriptions Department, Aslib, 3 Belgrave Square, London SW1X 8PL.

Manuscripts and editorial enquires should be addressed to the Editor, *Aslib Proceedings,* Aslib, 3 Belgrave Square, London SW1X 8PL. Manuscripts should be 1,000 to 3,000 words, typewritten, double-spaced, single-sided on A4 paper. Figures should be reproducible. An abstract of up to 200 words should be included. References should follow British Standard 5605:1978. Published authors will receive twenty-five free offprints of their article.

Advertising information is available from the Editor, as above. Further information about Aslib's services and membership rates will be supplied on application to the Director, Aslib, 3 Belgrave Square, London SW1X 8PL. Telephone: 01 235 5050; telex: 23667 (answer-back Aslib London).

© 1984 Aslib and contributors

ISSN 0001 253X

010.5
AS 52 Proc.

The Government's role: creating the right climate for the technological revolution

J. Allan Stewart, MP

Paper presented at the Aslib conference 'Information for National Recovery: Needs—Resources—Technology', University of Stirling, Scotland, 13–16 September 1983.

IT GIVES ME great pleasure to open this conference, the 56th in the long history of your association. I welcome you on your return to Scotland. I am glad to see from your conference programme that it will not be all work, and that you will have an opportunity to visit local places of interest, ranging from a coal mine to a whisky distillery.

May I also welcome you to Stirling University, which I am sure you will agree provides a splendid setting. In its early life Stirling received a mixed press, but it has matured into an exciting and innovative institution. In particular it is developing strengths in the new technologies, making it a most appropriate venue to discuss information technology. As you may know, Stirling Science Park was launched last year with the announcement of a £38 million investment by Wang. I am glad that you will have an opportunity to hear one of its most active members, Professor Cannon, who will be speaking on the subject of commercial information later this week.

The last year has been an important one for Aslib. The change in name from the Association of Special Libraries and Information Bureaux to the Association for Information Management is a very wise move. It highlights the shift of emphasis that has occurred in Aslib's work, from looking at the practicalities of handling data to the proper management of information as a vital resource. I am sure that these fundamental changes were not achieved without much hard work and effort on the part of the staff and the members of Aslib. It is to your credit that as well as coping with reorganisation, you have continued to provide an excellent service to your members. The number of your activities is too varied and too vast to enumerate here, but I would like to commend your recent work on the law of copyright, in conjunction with the CBI, and the continued expansion of the Online Information Centre.

This restructuring will enable Aslib to play an increasingly important role in the future, as the management of information will affect all aspects of our industry and commerce. You are probably all familiar with Professor Stonier's writings about the use of information as a resource, and his argument that our future prosperity will depend upon our ability to handle it effectively. He argues rightly that information technology has as much to do with the quality of the information as with the technology on which it is stored. After all a

Aslib Proceedings, **36**, (1), January 1984, p. 1–6. Printed in Great Britain

home computer may be a wonderful thing, but it is of limited use if it is only used to play video games; what makes it really effective is proper software.

The title for your conference, 'Information for National Recovery', is appropriate. At various points in our history technological advances have occurred to drive forward the growth of our economy. In the first half of the nineteenth century there was steam power, followed by railroads; in the twentieth century we have seen the impact of electricity and the automobile. Now we are experiencing an information technology revolution. I am sure that this is happening on a greater scale than any other previously experienced by our society; it is occurring at a far greater speed than any of its predecessors; and it is having an immense impact on all aspects of life. Forecasts have suggested that in five years' time the world market in information technology products and services may be worth over £300 million per day (at 1980 prices). The world trade in information technology products was around £54 billion in 1980 and is expected to rise to £105 billion in 1985—that represents a 14 per cent a year growth rate.

The crucial question, as this conference recognises, is whether Britain can share in this growth of information technology, and fully enjoy the benefits that will result from the revolution. Will we be able to shift the balance of our economy towards these new high-growth activities, and away from our old declining industries? This is the challenge that faces the Government today. My aim tonight is to give a brief explanation of the measures that we have taken and those that we plan to take to meet the challenge.

The Government strategy

There are three elements in our strategy: the encouragement of free enterprise and individual endeavour; the promotion of competition and the removal of restrictive monopolies; and the provision of training, and support for research and development. I shall illustrate my theme by citing examples of initiatives which have taken place here in Scotland. These may be new to you, and I hope you will find them interesting.

Scotland provides a good example of a country which is learning to transfer its reliance from the old labour intensive traditional industries to the developing technologies. This is illustrated by the growth and importance of the electronics industry. This is now one of our major employers, more important in terms of jobs than traditional industries such as shipbuilding and steel. Scotland now has the largest concentration of semi-conductor manufacturers in the whole of Europe. There are over 200 companies active in this sector, ranging from multi-national giants such as IBM, among other things manufacturing their personal computers at Greenock, and small companies like Gaeltech who make transducers in the Hebrides. The success of the electronics industry does not mean that we in Scotland can afford to be at all complacent. But it does show that this country, like any other, must adapt or perish.

Private investment and individual endeavour

First let me turn to the promotion of free enterprise and individual initiatives. The growth of private investment must depend upon confidence in the economy. When we took office four years ago this confidence was sadly lacking, and we had to take radical action to reverse the decline. There have been significant improvements: the rate of inflation is now one of the lowest amongst industrialised countries, and interest rates are now much lower and more stable. In addition, we have introduced a large number of measures to help small firms to establish themselves, and we have made substantial changes in the tax regime to encourage extra investment.

Experience shows that discovery and invention depend upon personal initiative. They cannot be forced by excessive Government intervention or central control. This is especially true for information technology, where the industry and the market is subject to constant change and development. Perhaps the most famous example of success in this industry is Sir Clive Sinclair who has turned the computer into a household item. I am proud that Scotland has played a part in his achievement, for the Spectrum computers are manufactured in Dundee.

There are many more examples of British achievement in this area, less well known perhaps but equally laudable. Not far from here, in Dunfermline, there is a company called Fortronic which manufactures banking terminals. This company was started by two local men who identified a new market for banking equipment. From an initial contract with the Clydesdale Bank, Fortronic have gone on to sell their product all over the world. Recently, I was present at the announcement of a £20 million sales contract with Burroughs Machines for a world-wide franchise. This is a remarkable success for a small company.

The promotion of competition

The second part of the Government's strategy is the promotion of competition. No monopoly, be it private or public, can be healthy for an industry undergoing rapid expansion. The Government has taken two major initiatives in this area—the liberalisation of the telecommunications industry and the introduction of cable TV.

With the removal of the monopoly of British Telecom, Britain's telecommunication services have been revitalised. Consumers now have much greater choice; more services are provided through the telephone, new radio telephones have been licensed, and there is much greater choice in the range of equipment available. Most importantly, some consumers even have a choice in the network they can use. The licensing of Mercury Communications Ltd by the Secretary of State for Industry, means that Britain is the first country in Europe to have a choice of telephone systems. British Telecom have responded well to the challenge of liberalisation. Prices between major cities have been restructured, new services have been provided, and waiting lists for installations have significantly diminished. Following the mandate expressed at the General Election, we are taking powers to privatise British Telecom to make it even more responsive to the market.

Another spur to competition is the introduction of broad-band cable. This will mean that cable companies can provide their customers with up to forty new channels. The attraction of cable is not the prospect of *Crossroads* all day and every day, but the potential for developing completely new services. These include home banking, home shopping, burglar alarms, remote meter reading and local community services. It will provide an enormous choice for the user, create opportunities for new services and provide new employment.

Applications for the first round of cable franchise have already been submitted to the Home Office and the Department of Trade and Industry. Three of these applications came from Scottish companies, and I hope it will not be too long before Scotland is enjoying the benefits of cable. The decision on the allocation of the franchise will be announced in November.

Support for education and research and development

The final part of the Government's strategy is the support for education, research and development. This is happening in numerous areas, through changes in our education provision, through university support and through finance and industry; I have only time to give a *brief resume* of some of the activities.

People will only be able to take advantage of the new jobs created by information technology if they are trained to do so. The Government recognises the urgent need to prepare people to meet these changes. We have taken action at every level of education. In Scotland, in 1980, we set up the Schools Microelectronics Educational Development Programme which has a broad remit of improving information technology awareness in teachers and pupils alike. As a result of SMDP's efforts, and through the support of Government Micros in Schools Schemes, every secondary school and many primary schools in Scotland have at least one microcomputer—many have several. Moreover, SMDP is playing a vital role in software development (I know this is an area where Aslib has a keen interest); today there are more than 150 high quality programs available for schools in Scotland. This is the largest supported library of school software in Europe, and the only library which offers software at material cost. At the moment SMDP is being restructured, and its role is being strengthened.

In higher education, we have ensured that the Central Institutions give priority to the new technologies. Scottish universities have benefited from the 'new blood and information technology' initiative announced by Sir Keith Joseph last year, which provided over £18 million for extra lecturer and student posts. On our initiative, a microelectronics development centre (MEDC) has been established at Paisley College of Technology. This centre provides courses and training services to industry and commerce throughout Scotland, and designs courses for use at other institutions. It is unique within the UK.

Recently, my Department and the Manpower Services Commission carried out a study on the supply of skilled electronics manpower in Scotland. This study found that, as a result of the initiatives I have mentioned, the supply of skilled manpower had substantially improved in Scotland, alleviating the shortages experienced in earlier years.

The speed of the information technology revolution, and the breadth of its impact throughout industry, have created new training demands. All age groups are involved in this process. School leavers need to obtain skills to make themselves attractive in the job market; adults with redundant skills have to be retrained. Through the Manpower Services Commission, the Government is making significant progress in meeting the demands for training. The most exciting development in this area is the Youth Training Scheme. It only became fully operational at the beginning of this month, and though it has emerged from the Youth Opportunities Programme, it is a very different animal. YTS offers a coherent instructive year of work experience and off the job training. In its first year over 45,000 places will be available in Scotland which will cater for all unemployed sixteen year olds and many unemployed seventeen year old school leavers.

Information technology is a crucial part of YTS. All trainees receive, as part of their YTS programme, either training or work experience to promote literacy in computing and IT generally. A growing proportion of such training will be based at Information Technology Centres (ITeC). Ten of these centres are already operating in Scotland, and sixteen more are planned to open in the coming months. In these centres youngsters are introduced to a variety of computer and related technology skills, including computer programming, word processing, computer maintenance and keyboard skills. This 'hands on' experience will be invaluable to them when they start to look for work.

Our hosts, the University of Stirling, are to be congratulated on their initiative in this respect. They, in conjunction with the steering group of local employers, are sponsoring an ITeC to be established on the university campus here. I understand that the Centre is to be operational by the end of this year, and I wish it every success.

The MSC also provides retraining courses for adults. Information technology figures prominently in the TOPS courses ranging from specialist computing courses to the inclusion of information technology elements in clerical and typing courses. Now that YTS has been launched, MSC are considering the whole question of adult training. They are currently examining responses of their consultative document, 'Towards an Adult Training Strategy', and their preliminary recommendations are expected shortly.

Besides helping industry with training the Government also offers direct practical help to individual companies. This ranges from the massive £250 million Alvey programme, which provides support for collaborative research in advanced information technology, to special schemes to assist in areas such as fibre optics and robotics. There have also been ventures such as the Office for the Future Project which have provided many large organisations with an opportunity to develop information management. Under the Support for Innovation scheme individual companies are assisted with research and development of new projects and processes through the provision of grants and consultancy studies. In Scotland we have set up a company called INMAP, to encourage and advise companies on how to use microelectronics in their products.

All these initiatives sound very exciting. But there are some who have misgivings about the introduction of new technologies, because they fear that it will lead to a loss of jobs. This is an understandable human reaction, but is is a dangerous one. Those of us who are closely involved in information technology must make more of an effort to assuage these fears. We must emphasise that the real danger is this: if we fail to develop, exploit and sell technology then we face a progressive loss of competitiveness and the emergence of severe structural unemployment. On the other hand, if we employ and exploit new technology, we shall create new products, new services, and most importantly new jobs. After all, we have only to look at our libraries, for example, to see how services can be enhanced and expanded and improved by the adoption of information technology.

At the beginning of my talk I gave you a few figures about the developing market for information technology. What does this mean in terms of jobs? Recent estimates suggest that the servicing of information has created about one million new jobs in the past ten years. It is also thought that there are now about ten million in Britain involved in information-related employment. Even the number of clerical jobs in this country has risen since 1960 from three and a half million to four million. This shows that even though there may be job savings as a result of automation, there will also be job increases as the quantity and quality of service expands.

Conclusion

The opportunities created by the information technology revolution are tremendously exciting. Information technology creates new opportunities, new markets and new wealth. I have emphasised that the Government is committed to encouraging the revolution, through its three-part strategy. In the end, however, the success of the revolution will depend on the resourcefulness and inventiveness of our people. We must all respond to the challenge of the new revolution: as your new Director has put it, 'the future beckons'.

Information exchange in a North-South context: is there more to gain through co-operation than in trying to establish new markets?

John E. Woolston

Director,
Information Sciences
International Development
Research Centre,
Ottawa, Canada

Paper presented at the Aslib conference 'Information for National Recovery: Needs—Resources—Technology', University of Stirling, Scotland, 13–16 September 1983.

THE TITLE OF this first session of the 56th Aslib conference begins with the words 'The Competitive World . . .'. I do not deny that, within the more industrialized countries, the provision of information services is becoming an increasingly competitive business. Nor do I deny that this competition has benefits for the consumer. If it were not for the competition from people with new ideas, our information services might well have stayed in fairly traditional moulds. Countries that are richer, in human resources and in technology, can afford a pluralistic approach despite the inevitable inefficiency that results when the same information is processed for different, unco-ordinated systems and when users need to go to multiple sources to fulfil their needs. We pay for these 'inefficiencies' through higher prices, but we recognize that they are probably more than offset by the benefits of competition which appear in the form of 'better', that is, more responsive, forms of service.

But there are vast areas of the world where human society lacks the resources to emulate this experience. In what we call the developing countries, the technological infrastructure is far too weak to permit the development of competing services, even of a more traditional kind. If libraries lack photocopying machines and telex, if inter-city telephone communications are unreliable, and if the postal services lose almost as much as they deliver, even the concept of interlibrary loans is a dream for the future rather than a reality for the present. Some developing countries do enjoy a resource in the form of trained people, and countries like India have made great strides in employing this resource effectively; but many other developing countries lack schools for the training of information manpower, and the few persons who get trained abroad are often lost from the national scene (the brain-drain effect, as well as the loss of individuals through promotion to work that is no longer in the information-service sector).

Aslib Proceedings, **36**, (1), January 1984, p. 7–14. Printed in Great Britain

Often the suppliers of commercial information services in the more developed countries imagine that there is a market to be exploited in the developing countries. This view is quite often reinforced by senior people from the developing countries who, recognizing that their progress is impeded through lack of access to modern information, encourage the suppliers to make exploratory forays on distant shores. But, after some years of this type of interaction, we see a very small export market for information services from the developed to the developing countries.

Some of the reasons are quite obvious. A commercial supplier needs to be paid. Prices that appear reasonable in, say, the United Kingdom are astronomical in Bangladesh. And what is more, the prices need to be paid in foreign exchange, something which is in dreadfully short supply and which, even when it can be obtained, requires a lengthy bureaucratic procedure.

But there are more subtle reasons as well. Where there is no domestic information industry, there is little skill in handling relations with a foreign information industry. Here in Britain, you can manage your relations with the American and continental European information suppliers, because you have a domestic information industry and you can judge the relative cost-benefits of the different services in the range that is being offered. A country that has no domestic information industry can literally be victimized when its only possibilities are to depend on foreign suppliers.

Also the supplier becomes discouraged. Developing a new market requires making an investment, but putting salesmen on aeroplanes is becoming increasingly expensive, and there is always a need for follow-up investments in such things as the training of users. These investments can be continued only if a sufficiently large business develops. As long as the business remains small, the investments represent a very heavy overhead on the few sales that are made. An initial enthusiasm on the part of potential clients tends to dissipate quickly when, confronted with a surfeit of bibliographic references, the clients find themselves unable to get the documents that have been drawn to their attention.

It is my contention that a 'market', in the commercial sense of that term, barely exists in the developing countries. I do not have access to figures for the present sales by major online information suppliers. Clearly it is not zero because, for example, major cities in Mexico are now linked to the North American telephone network (and to packet-switching) and, since Mexico has been going through a rapid process of industrialization following its oil discoveries, it makes some use of the online commercial services from the United States. But this is only one country and it is a close neighbour. For the majority of the developing countries, such use of foreign information suppliers is just not happening. So, instead of looking at the market for these more modern services, let us just take a few figures for the market of a much more traditional form of information supply—the scientific journal.

The National Research Council of Canada supports the production of a range of national scientific journals covering most of the major disciplines. I have been permitted to have access to its sales statistics. A major United States publisher (one that prefers to remain anonymous) has also kindly provided similar data. After analyzing the subscriptions by country, my colleague, Ronald Archer, has produced the chart shown in Figure 1.

SCIENTIFIC JOURNALS

Figure 1

Subscription Sales in Industrialized and Developing Countries

Paid Subscriptions	Industrialized Countries*	Developing Countries
Canadian Journals of Research (10 titles)	93.10%	6.90%
A Major United States Publisher (65 titles)	95.82%	4.18%

*Consists of OECD countries, Eastern European countries, and South Africa.

Paid Sub-scriptions	India	OPEC countries	Brazil	Korea	Israel	All other Dev. countries	Total Develop-ing countries
Can. Journals of Research (10 titles)	1.92	0.76	0.64	0.58	0.30	2.70	6.90%
A Major US Publisher (65 titles)	0.74	0.38	0.43	0.48	0.49	1.66	4.18%

Both the Canadian and the US publisher have been in business for decades. Their products are well known and are frequently cited in the scientific literature. Their markets have stabilized. And yet these numbers clearly show that total sales in more than half the countries of the world are so small as to be almost insignificant.

Often I wonder whether there is not a deeper underlying factor: to what degree is 'our' information relevant to 'their' information needs? The people in the developing countries with whom we relate in discussions of information needs are often themselves people who have studied in Europe or North America. Or they come from that enormous population that has been taught to follow 'Western' values in local schools and universities that have grown out of the colonial experience. They see the economic development and the standard of living that we have been able to achieve; they try to emulate our experiences and to benefit from the information we are generating. But much of the information that we generate is of material relevance only in our social, economic and technological environment. How important is cancer research to a society where the average expectation of life is only fifty years? To the elite, yes. And it is to the elite that we listen. But the real structure of demand for that information is very shallow: a few researchers who seek to continue the work that they started as doctoral students in a Western university; or a few doctors practising for a rich, powerful, but not very large clientele in the capital cities.

And yet there is a vast information need. How do you organize a system of health-care delivery for teeming populations in rural areas where there are no doctors trained in modern medicine? Or in the slums that surround most major urban centres? For people whose per-capita incomes are no more than 100 GBP/year? Such information does exist. It has been produced by developing countries themselves in grappling with their own problems. But that information, if it is recorded at all, is in the form of typewritten or mimeographed reports sent to a few offices in the national—more often provincial—civil service. Much of the experience has never been recorded. Certainly only an infinitesimal portion of it finds its way to MEDLARS or to *Excerpta Medica.* For the real health problems of the poorer countries, our databases are quite inadequate.

Our databases are designed to respond to our needs. Some of what is there is certainly of value to developing countries. And delegates at international conferences plead for action to speed the process of technology transfer. But our databases often do not contain what would be of most interest and most value to developing countries—which is the information that they have themselves produced.

We cannot blame the database compilers in Western countries for failing to include reports on health-care experiences in the State of Uttar Pradesh. There is no market here for that type of information. So are we faced with such a division of interests and needs that we have to go separate ways? Should the industrialized countries go one way, and the developing countries be left to find their own solutions? In my view, that would be a simplistic conclusion and one that is not substantiated by the facts. The world is not really divided into two distinct groups, the rich and the poor. There is a fairly well-distributed scatter of countries along the spectrum from rich to poor. And countries are neither homogeneously rich nor homogeneously poor. We in the West have situations where a local lack of resources results in a socio-economic situation that more closely resembles that of the Third World. The

Third World has its local situations where a combination of resources and entrepreneural initiative leads to rapid industrialization.

There is also the moral imperative. We share most of the same genes as well as the same planet. Our societies are economically interdependent, as we all saw in 1973 at the time of the changes in oil prices. We are socially interdependent: a war or revolution anywhere now has global repercussions. And culturally too, we have seen how artistic expression is enriched through exposure to alien forms and concepts. What happens in Ecuador has an impact in Scotland, and we diminish our lives if we ignore it.

If we are to accept our responsibilities as citizens of a global community, we need to have a better understanding of what is happening in the developing countries. If we are technologists, we need to know what technical problems are confronting the people who are trying to improve the supply of goods and services in those other parts of the world, and to involve ourselves in the identification of solutions that will be appropriate to the material and human resources available there. If we are social scientists, we need to better understand the problems that exist within developing countries before we can define options for more effective relationships between developing and industrialized countries. Too often we rely on the perceptions of our own scientific community as to what is happening in the developing countries. Indeed, our databases are very fruitful if we want to know what developed-country scholars think of the situations in the Third World. But we have very little access to what developing-country scholars are saying about their own home environments.

So one must ask whether there are grounds for believing that we can set up mechanisms that will produce an effective information exchange among the societies all along the spectrum from rich to poor. If we can do so, we shall be responding to the aspirations that have been expressed in countless international meetings and that have been enshrined in various declarations, such as that calling for a New International Economic Order. In so doing, perhaps we can make our own small contribution to global understanding and to a more equitable distribution of the benefits to be obtained from the world's resources. But clearly, we must try to prescribe solutions that do not take away from what has already been achieved in the industrialized countries: we must guard the advantages that derive from competitive initiatives in those countries that can afford to follow a market economy.

I believe we do have models that are appropriate: models that are based on a formula for equitable work-sharing, that deliver the products at prices that all can afford, and that stimulate, not stifle entrepreneurship.

I am referring to what we often generically call the 'co-operative international information systems' which I can illustrate by specific reference to AGRIS—the system managed by FAO to cover the agricultural sciences and technologies. The concept is one that could be applied with a discipline-oriented approach, but a mission-oriented approach is probably more likely to be successful. 'Missions', more than 'disciplines', are identifiable with government departments or institutions; hence, activities that correspond to missions can more easily invoke the allocation of public money. Also, most of our international intergovernmental organizations are structured to undertake mission-oriented programmes (FAO for agriculture, WHO for health, ITU for communications, IAEA for peaceful uses of atomic energy, etc.). By contrast, if we try to promote international co-operation in discipline-oriented subject areas, we are likely to be dependent on national and international professional associations that are much less well endowed.

The formula that has been adopted for AGRIS is one that calls for each country to report the new information that has been published on its own territory. Indeed, this is the price of admission to the system. But it can be paid by employing one's own nationals at local salaries to do a job that needs to be done in any nation—to make an inventory of the agricultural information that is put out by one's own publishers. The job can be done by public employees working for, say, the Ministry of Agriculture, or the government can contract the work out to a university or to an institution in the private sector. FAO and the other participating countries make no restrictions other than that the AGRIS methodology be followed. And that methodology is one that has been established by consensus among the participating countries with the technical support of the FAO Secretariat.

In return for paying this price, each participating country has the right to receive a copy of the database that FAO produces by merging the contributions from all the participants. That database can be obtained both in the form of a printed bibliography published monthly, or in the form of updates on magnetic tape to the accumulated set of records—which, incidentally, is now getting very close to one million items. The participant acquires the database free of charge and can choose for himself how it is to be exploited on his own national territory. Hence, a government can choose to put it up, in whole or in part, on a computer in the Ministry of Agriculture (as, for example, has been done in Tunisia), or the government can make it available to one or more private entrepreneurs who then may sell online searching and SDI services.

Such a database can be exceedingly rich in the way it reflects the information that is being produced in all countries. National organizations have the best possibilities for acquiring the information produced in their own countries. All of us know the difficulties that are encountered when one embarks on a programme to make a comprehensive collection of information in a given field from all over the world—even when the field is quite narrow. For something as broad as 'agriculture', even an organization with the resources of the US National Agricultural Library admits that it cannot establish relations with all the sources in other countries, particularly as much of what is produced today is in the form of 'non-conventional literature' (technical reports, conference papers, theses, etc.).

When, as in the case of AGRIS, both industrialized and developing countries are participating in a common system, each has a window on the other's production. Each has equal right to a copy of the entire database (and, of course, each is free to discard those records that it may consider to be irrelevant to its own needs). Each has an equal voice in the overall management of the system. Each pays, by providing input, at a rate which is determined by the level of information production within its own society—a rate which probably also roughly matches the rate of information consumption (producers of information are also the main consumers of information in the same subject area). To the extent that the FAO budget needs to be augmented to manage the AGRIS operation, all countries contribute according to the United Nations normal assessment formula, which is calculated according to each country's ability to pay.

So I would submit that, in the AGRIS model, we have found a formula for information-sharing which responds to global needs and puts no country in a position of dependency. The main deficiency at present is that AGRIS still lacks an effective document-delivery component to back up the bibliographic citations contained in its database. Some progress has been made, particularly by regional institutions that have been acting between the national participants and FAO itself. For example, the Inter-American Institute for Agricultural Cooperation (San José, Costa Rica) has introduced a coupon system that facilitates the delivery of documents cited in AGRIS by Latin American countries—the purchaser pays, and the vendor receives, each in his own national currency. On a global basis, the International Nuclear Information System (INIS), which is managed by the International Atomic Energy Agency, has instituted mechanisms by which all non-conventional documents recorded in the database are acquired and put on to microfiche, and copies are then sold against payments in local currencies. INIS, like AGRIS, is an international co-operative information system operating on the same 'territorial formula'.

It is true that systems like INIS and AGRIS have caused anxiety to entrepreneurs who fear that such developments may compete unfairly with their own efforts. I submit, however, that such anxieties are ill founded and, indeed, that the availability of such databases gives new opportunities for entrepreneurial activity to serve a domestic market. Nowhere can one find a governmental or private organization that, alone, could find the resources to construct a database with anything like the content of AGRIS. We all know that the most expensive component of an information operation is the capture of the input data. In AGRIS, that is done for us by the participating countries. And, in any country, the government could make the database available to one or more entrepreneurs who could then compete with each other (and with foreign suppliers) in offering service out of that database and in refining the process of document delivery. Why should an entrepreneur waste money in recapturing data that has already been captured more comprehensively than he could ever hope to do so? His clients are interested only in what he can deliver.

So, in conclusion, I see the co-operative international information system as a mechanism which provides for effective North-South collaboration on the basis of equity and as one that helps the suppliers of information services, whether public or private, to augment the inventory of material that they offer to their clients. Hence, we should welcome it rather than fear it. There is great scope for extending the model into other subject areas, and I would suggest that public health might be one of the prime candidates. And the formula does not necessarily require the participation of governments with management entrusted to an intergovernmental organization. In more specialized subject fields, the formula could be applied in any world-wide network of institutions with common interests. My own organization, for example, is working with other research-funding agencies to establish a co-operative information system that will give data on the various research projects that they have been supporting. Each will report his own projects, but then each will have access to data on the projects supported by all the others.

Within the next few years, we can be assured that all capital cities will be linked by telecommunications permitting the transfer of large volumes of data at very low cost. We have choices to make in how we use those new facilities. One way would be to speed up the process by which input is made to co-operative information systems and by which new increments to the databases are distributed to information suppliers. Each supplier could then tailor his services according to local needs and what his clients are prepared to buy. This, in the long run, is likely to be a more acceptable choice than one that requires clients to conduct their searches on host computers located only in Europe and North America. What could be lost to the information supplier in Europe or North America is a very small potential market in the developing countries; what could be gained is a potentially vast amount of data on which to base improved services to the more profitable markets in the industrialized centres. For the developing countries, of course, it gives them a chance to progressively improve their own information services without a drain on foreign exchange.

The challenge that the developing countries pose to the industrialized countries when they demand a more equal partnership in the information sector is a challenge that modern technology permits us to meet. In responding to that challenge, we can gain access to information that has developed from perspectives quite different from our own (thus enriching our knowledge of the world). And we can do this without damaging the advantages that we have gained by encouraging competition among information suppliers.

European information policy situation

C. Jansen van Rosendaal

Director, DG XIII-B, Commission of the
European Communities

Paper presented at the Aslib conference 'Information for National Recovery: Needs—Resources—Technology', University of Stirling, Scotland, 13–16 September 1983.

Introduction (growing importance of information)

THE 'INFORMATION SOCIETY', the convergence of computing and communication and the clear trends in the growth of information-related activities is a much discussed topic. During the last decade, the importance of the information industry for the economies of the Western World has become a recognized fact. The enormous and still rapidly increasing possibilities created by new information technologies will accelerate this trend in the eighties and nineties.

It is not surprising therefore that in the European Community, there is a growing awareness amongst governments, politicians and industry of the importance and value of information itself. Information is one of the few non-scarce raw materials for the economy of Western Europe, with the information industry one of its few sunrise sectors. The timely and inexpensive availability of information makes it a motor for innovation and therefore a driving force for economic and social development.

The very title of this conference 'Information for National Recovery' reflects the emergence of these developments and ties in with the optimistic outlook many of us have for the future of the industry.

Complicating factors

We must however be cautious in our forecasts. We must be aware of the uncertainties which the new 'information society' can generate. Under the macro-trends of the information sector, there are many sub-trends. They are not all going in the same direction. They do not always affect the same people or affect them in the same way. It is important to take these factors into account, especially if the most appropriate 'information policies' for our new information age are to be elaborated.

We all know that statistics can play us tricks. This reminds me of the story of the lawyer who when he was ready to retire, looked back over his career and decided that on average 'justice had been done'. In the first part of his career there were many cases which he should have won, but that he had

Aslib Proceedings, **36**, (1), January 1984, p. 15–23. Printed in Great Britain

lost due to his inexperience. In the second part of his career there were many cases which he should have lost but that he had won due to his experience. So, in fact, on average 'justice was done'.

The nature of information is such that we cannot simply expect 'the third industrial revolution' to pick up where our decaying 'second revolution' is ending by invoking statistics alone.

We live in the Western World in a rather regulated society; be it that the level of regulation differs from country to country, the speed of development of NIT and its use goes much faster than the adaptation of regulations in this field. The political attitude from the side of governments and politicians towards the possibilities that NIT offers, is cautious and shows many defensive aspects. New regulations often give the impression of being ad hoc and of protecting existing traditional interests from a nationalistic viewpoint. The development of new regulations shows moreover a growing divergence per country.

I believe that it is necessary, in order to stimulate a sound and balanced evolution of the information society, that a coherent set of internationally accepted 'rules of the game' should be formulated, serving as a common basis for national information policies.

I know that this is easy to say, not easy to achieve!

I will briefly give you some examples of factors which complicate the information scene; I will also come back to them later in more detail, to point out their impact.

Firstly, although the importance of information is indeed growing and, as I said, has many of the attributes of a sunrise sector, other factors come in which make it unclear how it will exactly affect the final demand for information. It will undoubtedly be a source of major investment in the future and information will continue to grow in its significance as an input to all types of goods and services. Many new information services will evolve. The extent to which these will be substitutes or complements to existing services is not yet clear, although it is clear that the information scene will and must continue to change.

Secondly, information has many unique characteristics and it cannot be treated completely as an economic commodity. It has some of the qualities of a public good. It follows that government has played in the past, and will continue to play in the future, a significant role in the information market. However, this can lead to an unclear competitive situation in the market place which can become a disincentive for private investment in the industry.

Thirdly, the very pervasiveness of information in almost all sectors of economic and social life, its horizontal characteristic, means that it touches on almost all domains and has an impact on a broad range of other policy areas. If the information market is defined as 'the market for value-added information services', then an information market policy interacts for instance with new information technology policies and telecommunications policy insofar as these services use the new telematics technologies. However, the concerns and issues of these policies are not totally synonymous with the concerns and issues of information market policy. The market for the technologies themselves or for telecommunications services is also not quite synonymous with the information market as defined above.

I am emphasizing this point as I think we should be clear in our minds as to whether it is actually feasible to think in terms of an overall information policy which would cover all these policies. Given the different forms of regulation for the different sectors of information-related activities, the different domains which these involve, it is questionable whether we can have one overall coherent policy to cover all of these. It is more feasible to think in terms of a co-ordinated set of policies which takes account of and reinforces the already strong ties and interrelationships between them.

Finally, I must refer to the cultural value of information. Information is not only an economic good or service. It is also of strategic, social and cultural value, which brings in an additional dimension and complexity. This is particularly important in the European Community, where we have ten different Member States, seven official languages and we use two alphabets. The cultural and social diversity of Europe is one of its strengths and riches. This same diversity must not however lead to the development of attitudes which are economically unfavourable.

The information market (Europe—US)

Having said this, I will now talk about the information market itself as I defined it above: 'the market for value-added information services'. With this definition I am not making an arbitrary limitation, but focussing on what can well be considered the key to 'Information for National and International Recovery'.

If we *are* looking for recovery or renewal, we have to focus on these information activities which truly add value for users and not only on those which automate routine activities. Unless we consider the user and his real needs, technological advance—the content and not only the conduit of the new services made possible by electronic technologies and new channels of communication—will remain in a vacuum.

What now is the scale of the information market and how does Europe measure up in comparison with the United States?

If we look at the 'traditional' parts of the information market, in particular the publishing industry and information services such as libraries, we find that Europe bears up quite well in comparison to the US. Overall, in terms of economics, it compares very favourably—especially in high level scientific publications.

However when we look at information services using the new electronic technologies we see quite a different picture. In 1981 Europe had an online information market with a turnover of only $185.7 million. I don't think I need to point out that this is a minimal penetration of the global information market, even if this segment is in many ways still in its infancy. The comparative figure in the United States was estimated to be $680 million, or three times that of Europe. Moreover American suppliers accounted for almost 50 per cent of the general S and T section of the online market in Europe.

If we use another indicator and see how much public data communication is actually associated with information services in Europe, we get a similar picture. As an example, only 1.8 per cent of terminals used for data communication are officially classified by the PTTs as 'information retrieval'. Thus the penetration of NIT into information services seems to be substantially lagging behind its penetration into general data processing and communications.

We still have a long way to go before the owners of microcomputers, for example, progress from using their machines purely for their home purposes to using them to draw on external sources of information. In the United States this is already becoming a reality! Nor have we witnessed to date, in Europe, any great movement by the traditional information suppliers into diversification of their products and services into the new channels provided by the new technologies. This is again in contrast to the situation in the United States, where almost daily new manoeuverings are reported of corporations diversifying to secure their strategic positions in future markets.

What is even more telling perhaps is that when some European firms do undertake such diversification, it is not in Europe that their first moves take place but in the US itself. (This is perhaps now less true here in the United Kingdom, with the recent moves in cable, etc.)

Information market—condition for success

The reason for this gap between Europe and the US is partly due to the earlier development of the electronic information services in the United States. The Federal Government played a major role in this development through such agencies as NASA, ARPA and the National Science Foundation. This began in the late fifties and continued right up to the mid-seventies. It was a significant stimulation when combined with the relatively large homogeneous US market.

Similarly in Japan, there is not only a strong centralized relationship between government and industry but also a systematic exploitation of this domestic market as a platform for its export drives. This has brought it a world leadership, particularly in consumer electronics. Japan is also increasingly turning its attention to the information market itself for its next step.

In both countries, though done in a different way, the parallel is clear:

- *relatively large and homogeneous domestic markets which give economies of scale;*
- *start-up stimulus from government in combination with industry;*
- *favourable room and market conditions for private enterprise.*

The European situation

Europe, in contrast, is made up of many segmented markets, divided by various barriers. Some of these are natural, such as language, but many are not so natural and in many cases can be avoided. Some of the reasons can be found in the fact that the information industry has developed out of the traditional activities which were national responsibilities.

Europe has different copyright laws, different roles of government in the dissemination of information, different practices with regard to privacy protection and advertising, different fiscal and taxation treatment of information and different ways in which the national telecommunications monopolies exercise their rights. We have historically various mixed private/public organizational structures with varying obligations imposed on these organizations by national governments.

In the traditional information industry, the national markets in most Member States were sufficient to accommodate the local information industry. As an example about 95 per cent of advertising budgets in Europe originate and are spent in the same country. However this situation will be changed by the advent of new services which are increasingly distance independent and need to cross borders to become financially viable.

Service providers such as the Americans, working from their experience developed in their relatively barrier-free domestic market, will continue to hold a comparative advantage over European service providers, unless the multiplicity of barriers hampering the optimal use of economies of scale in Europe is reduced.

Information market barriers

Where therefore are the barriers which prevent greater European involvement in new electronic information services? Let me mention some of them:

1. The respective roles of the public sector and the private sector in information supply and dissemination. These roles vary from country to country, leading to unclear situations for private investors and sometimes very different price situations as a consequence of subsidies.

   Although the awareness of the economic value of information is growing there are still legitimate arguments on both sides, for instance, on the extent that the true value and price of information can be reflected in the market place and on the fundamental role to be played by the public sector. Thus the problems are not going to be solved in one day.

   But, as a minimum, a clarification of 'rules of the game' and a measure of agreement on such rules throughout the Community is necessary to enable the private sector to invest appropriately in new information services.

2. In many countries the infrastructure used for new information services, such as telecommunications, is regarded as a 'natural monopoly'. With developments in computing and telecommunications technology the extent of such a monopoly is being questioned particularly at the value-

added services end, because of constraints it is imposing. Thus there is a need to review present regulations in areas such as:

- — rules of access for the private information providers to the new media
- — level and structure of tariffs, especially for new telecommunication services
- — harmonization of these tariffs throughout Europe
- — choice and use of interface equipment
- — normalization and standardization

3. Differing national rules and regulations can also act as indirect barriers to information flows within the European Community, for example:

- — privacy protection regulations
- — copyright laws
- — taxation practices
- — rules on establishment of services

4. Technological developments during the last years are decreasing the distinction between the different types of services, thus potentially increasing the competition between them—for instance between mass-media type services and specialized ones. The differences in practices in each Member State for these services can also potentially lead to distortion in their development—especially if in one country they are considered to come under the regulation of the media, and in the other they are not.

The full potential of the economies of scale of the European market can only be reached through a balanced development of the market taking place in all Member States. The economies of information networks and services are such that the more widely accessible they are the greater is their viability. If there are major differences in the timing of the introduction of new services between Member States or between different regions then this can create real imbalances. It can be argued that such imbalances discriminate more against the less favoured regions of the Community and thus widen rather than narrow the gaps.

The response of the European Commission

In its Communication to Council of November 1979, 'The European Society faced with the challenge of New Information Technologies: A Community Response' [COM (79) 650 Final], the Commission recognized the broad impact of the new information technologies and proposed a number of measures as a community response to this. These included:

(a) The development of a social policy to prepare the climate for innovation;

(b) The use of the normative powers of the Community to create a homogeneous European public market for telematic equipment and services;

(c) The promotion of a European information industry;
(d) The fostering of industrial and user collaboration;
(e) The enhancement of the value of national and European programmes in the field of satellite communication and detecting earth resources;
(f) The application of new technologies by the Community itself.

This broad programme of actions has led to a number of activities aimed at specific objectives within its framework. For example ESPRIT (the European Strategic Programme for Research and Development in Information Technology), INSIS (Inter-Institutional Integrated Services Information System), CADDIA (Cooperation on the automation of Import/Export and Agricultural Documents and Data).

Within the activities of my own directorate in DG XIII, substantial actions have already taken place or are ongoing, aimed at information market development, for instance:

- Euronet-DIANE influenced the introduction of the world-wide standard X-25 for packet-switched data transmission.
- In three years, it has made some 390 databases accessible on over forty hosts throughout Europe.
- The first call for proposals for the promotion of high quality information services generated ten times more proposals than could be supported with the funds available.
- We have already received positive feedback from our initial BRIDGE (Export of Information to North America) project. This shows there is a demand in the United States for European electronic information services, which are of good quality and are user friendly.
- We are preparing several extensive experimental projects in co-operation with ESA (European Space Agency), telecommunications authorities, several private enterprises, etc., in the field of document delivery using satellite transmission possibilities.

From this description, I think it is obvious that the Commission has emerged from the framework of the Communication to Council of 1979 with a set of actions. These respond in a pragmatic way to the variety of economic activities which are affected by new information technologies and the diverse domains involved, as I outlined earlier.

Also within the framework of this Communication to Council, the need for the creation of a favourable climate for information market development was recognized. It also noted that the establishment of legal and policy frameworks to permit the most effective Community-wide use of new facilities was required as, for instance, for direct broadcasting satellites.

This is in effect the task which information market policy must set itself by taking into consideration the user and his needs, the content and not only the conduit of new services. Its aim must be to provide the cement to bring together the diverse aspects of the new information society and to be the link between various but related policies.

Substantial work has already been done in various areas of the information

P 3673

market, such as copyright and standards. However this work has often been done with little cross-referencing of the impacts of various legislation/regulations across the total information scene. Market development calls for a complementary effort to improve market conditions. The time is now ripe to make the harmonization process go faster and to integrate information market-related activities in a coherent fashion.

Member State policies

Community policies must of course be linked to and co-ordinated with Member State policies. The growing awareness of information market barriers has led most Member States to start to take a fresh look at their national information policies.

However, the international nature of these barriers and the horizontal characteristics of information, which usually means that there are a number of different government departments involved, creates further complexities in national contexts. National interpretations of implementation procedures for privacy protection can, for instance, lead to market distortions at Community level, even where international guidelines exist such as those of OECD and the Council of Europe. The advent of direct broadcasting satellites calls for a common understanding and agreement on basic principles affecting advertising, censorship and right of access in Europe. Different rates of liberalization in telecommunications policies in different Member States can in themselves lead to competitive distortion.

These and other issues call for a European framework to provide the proper market conditions for the information industry to flourish.

Such a framework would also provide Europe with the basis to develop a strong common position in international negotiations with third countries (such as the US, Japan and developing countries). For instance, the differences between the US and Europe in the way telecommunications services are provided can lead to clashes and divergencies not only between Europe and the US, but also within the Community. Overcoming misunderstanding on this is essential, if common ground on which to develop policies for information flows is to be found. Individual Member States are in a weaker position to develop this common ground, unless a consensus within a European framework can first be reached.

I can use an additional argument. On a world scale it is becoming irrelevant whether individual Member States should aim at protecting domestic markets through 'production led' policies, or whether they should adopt 'market led' policies which might open the market to all comers, national or foreign.

Many American and Japanese commentators are already writing off Europe as a serious contender for a top position in the new information age. Their experience has shown them that they are in a better position to deal with the segmented markets of Europe than the Europeans themselves. They can use the advantage of their own domestic economies of scale to extend into Europe more than European producers can, working from a much smaller domestic base.

The driving force for these developments is of course technology, which is no respecter of national boundaries. Thus the extent to which national 'production' policies have control over the situation is in fact rather limited; the already 'lost markets' of consumer electronics and large mainframe computers demonstrate my point.

Community Information Market Policy

We are therefore in the process of preparing the ground for the elaboration of a Community Information Market Policy whose major objectives will be to provide this European framework.

We have initiated a series of informal consultations with Member State governments and other interested parties, such as representative groups from private enterprises and professional associations as well as independent experts. These consultations have confirmed our initial thinking on the importance of the issues involved.

In none of the Member States does there seem to be a single coherent 'horizontal' information market policy. This lack of a general policy framework both at national and Community level is considered by many as real constraint to the favourable development of the information market. Many feel that a simple extension of existing structures, practices and regulations to include new possibilities or services will lead to a worse situation in the medium and long term.

In parallel, there is a general consensus on the lack of global, political and management awareness of the interrelationship of issues directly and indirectly relevant to the complex 'information market/information technologies'.

This absence of a coherent policy framework is already generating a number of market distortions and non-technical barriers to trade, as I have pointed out. Their full impact is not yet entirely felt but they will certainly significantly affect the evolution of the information market in Europe.

Therefore, more co-operation, more dialogue and understanding between these parties at all levels are needed to improve conditions and remove unnecessary barriers and, of course, new rules of the game have to be formulated! This is what we have set out to achieve.

Information—the basis of Japan's forecast technological and economic development

Favourable environmental factors for the 'informatization' of the Japanese society and the consequences for Europe

Christian Galinski

International Information Centre for Terminology (Infoterm)

Paper presented at the Aslib conference 'Information for National Recovery: Needs—Resources—Technology', University of Stirling, Scotland, 13–16 September 1983.

Introduction

BY THE BEGINNING of the eighties probably everybody in Europe should have recognized that the focus of industrial development and trade has shifted from the Atlantic region to the Pacific. If the US reoriented its main political and economic interests towards the Pacific basin that region would account for more than two-thirds of the international economic and commercial potential. Such a tendency exists; it is partly due to Japan's stunning economic success, which is going to trigger a similar technological and economic development in the so-called NICs (newly industrializing countries) of East and Southeast Asia, i.e. Singapore, Hong Kong, Taiwan and South Korea. In all these countries there is an industrial policy and the will of the people to follow—but not necessarily to imitate—the Japanese example. The international competition within the region is therefore an important stimulus to further enhance Japanese development.

Europe has always underestimated Japan, considering it at best a junior partner in world economics and politics. Therefore some long-term patterns of Japanese development have not been taken into account, though recognized and pointed out by a few people. These long-term patterns are:

- decades or even centuries of cultural and/or political seclusion or opening;
- a high rate of cultural and technological transfer even at times of seclusion;
- an openness towards foreign influences, which are tested and selected much more widely and freely than by other peoples;

— a powerful zeal to master advanced fields of learning and knowledge combined with a deeply rooted cultural self-confidence and a longing for national independence, etc.

There are three main topics on which I would like to elaborate from a 'Pacific' viewpoint:

1. Today Japan seems to be moving incessantly towards the top of a wave of technological-economic development. This development has a very broad base and is founded on a combination of several favourable factors. Information plays a crucial role in this development.
2. Europe's attitude towards Japan so far can be characterized by mainly negative reactions and serious distortions in the Western image of Japan.
3. Europe will have to react to the development in the Eastern part of Asia—or rather the Western part of the Pacific. The future role and status of Europe in the concert of nations will be largely influenced by this reaction.

This paper will focus on 'information' in Japan taking due account of the economic, political and technological framework of its development. The concept 'information' (J: *joohoo*) seems to convey more meaning in Japan than it does in Europe. Information encompasses all findings derived from human knowledge and scientific research and represents the basis for future research and development. By this, it gains—at least for Japan—the quality of an important 'new raw material' or 'new resource', the use, application and transfer of which has to be promoted for the sake of the nation's welfare. Thus information includes large parts of communication, management system engineering, automation, many so-called 'intelligent products' and last but not least information conveyed by the general news media. It is not surprising that the Ministry of International Trade and Industry (MITI) covers a major portion of information activities in science and technology in Japan (ref. 9, p. 63). Depending on its application the term 'information' can stand for a variety of concepts.[13] For the purpose of this report it shall be defined as in the abbreviation 'I and D in science and technology'.

Japanese efforts to level-up technology

In the fiscal year ending March 1982 government and industry spent a total of $25 billion for research and development (R and D) which is 2.4 per cent of the gross national product (GNP). This is up almost fourfold compared to about ten years earlier—an annual increase of more than 10% with ever rising tendency (ref. 16, pp. 163–4). In a few years Japan hopes to be able to devote as much as 3 per cent of its GNP to R and D, which would make it a leader in this category. It has further stepped up technical training, producing 800 Ph.D. scientists and 74,000 engineers a year. Efforts for technological innovation are made in an increasing number of fields. The results of these efforts will become evident several years later in international industry and trade.

Main areas of development

What is remarkable is the new stress on the development of basic technologies, which in the past have been somehow neglected due to rather non-economic factors, e.g. social ones. In its policy vision the Industrial Structure Council (ISC) identifies the following four items as basic requirements and future challenges facing the economy (ref. 26, pp. 42f.):

(a) overcoming energy constraints;
(b) qualitative improvements in the standard of living and community facilities;
(c) promotion of a more creative, knowledge-intensive industrial structure;
(d) great stress on the development of second-generation technologies.

In view of the vital importance of the first three challenges for the 1980s, ISC designates the following technologies as 'priority technologies':

1 energy related technologies
1.1 technologies for the development of alternative energy
1.2 energy-saving technologies
2 technologies capable of meeting diversified consumer tastes
2.1 social system technology
2.2 medical and welfare technology
2.3 environmental protection and disaster prevention technology
3 technology-intensive industries
3.1 information technology
3.2 aircraft industry
3.3 space industry

Recognizing their central importance and taking a long-term point of view ISC calls the second-generation technologies 'basic technologies', listing

1. new materials technology
2. biotechnology
3. technology of elements providing new functions

If development is going in the direction outlined above future trade disputes over products of a very broad range of industrial activities are imminent.

What should be even more important to recognize in the West, however, is the holistic and systematic approach described under the heading 'priority technologies'. Since the seventies Japan has developed a systems approach in its ideas of itself and in the planning of its national development. Based on an essentially ethical attitude this includes the welfare of the nation in its natural, cultural and economic environment. The ideas expounded here go far beyond anything similar in the West. They are clearly to be allocated on a higher idealistic and moral level than aims and objectives usually put forward at the level of lobbies and pressure groups. Has the West for instance duly taken notice of the fact that Japan spends more money on environmental protection (3.4 per cent of GNP) than on defence (0.98 per cent of GNP which is 7.1 per cent of the public expenditure) and even on R and D?

Other efforts which are also not sufficiently taken into consideration in the West due to a lack of familiarity with the Japanese situation are those of small and medium enterprises. Small businesses account for about 70 per cent of all Japanese output, vs. about 40 per cent in the US. At this economic level competition is especially rough. MITI with all its 'small and medium business policies' has so far been unable to curb it—particularly when it occurs in growing industries, such as the information industry. Showing annual growth rates of 20 per cent upwards, it has a large share of small and medium enterprises. According to MITI philosophy, big industry deserves priority. However, the brands on the electronics products sold in Tokyo's Akihabara district prove that small and medium enterprises are doing quite well without governmental support. Recently some relatively new computer makers, like SORD, are given major chances to win a fair portion of the market for their goods at home and abroad.

Past measures for promoting small and medium enterprises mainly focussed on economic efficiency to be achieved by means of guidance in technology. It has, however, again been recognized recently that development in this part of the economy more than elsewhere depends on harmony between the families and business activities. Unless stable management activities, as well as stable family life for the owner and his family, are attained, measures for the promotion of small and medium enterprises cannot be effective in a real sense (ref. 27, p. 41). Besides the moralizing concern of MITI, there is a general reappraisal of the important role of these enterprises as regards innovative spirit and progress. At present new and as yet unknown Japanese computer brands are entering the European market. Other similarly successful enterprises in other so-called 'high-tech' fields (e.g. biotechnology) will appear as soon as they have stood their ground in fierce domestic competition.

Industrial policy, domestic competition and information

To speak frankly—there is no country in the West without an industrial policy of some kind or other. In the US it is carried out extensively in the form of military R and D projects. Every other industrialized country has its instrumentarium to support certain key industries directly or indirectly. What disturbs us in the West is that industrial policy in Japan—despite much lower figures for public spending (ref. 22, p. 22)—just seems to work more effectively. The only conclusion from this is that there must be other reasons for the relatively better performance of Japanese industry. Beside generally known aspects such as better preparation, highly motivated management, more highly qualified workforce, etc., the role of fierce domestic competition has to be mentioned at this point.

An increasing number of experts on Japan no longer believe in the talk of 'Japan Inc', a Western concept of Japanese cartels—or one monolithic Japanese economic block—to explain so-called 'unfair practices', hidden barriers to trade, etc., which were responsible for a poorer performance of Western companies in the light of Japanese success.[35] In this connexion the role of the Japanese government is generally overrated. Government assistance—especially through the frequently overestimated MITI—has helped some key industries such as computer chips (VLSI), mechatronics (the modern face of machine tools), etc., get off the ground by advancing them technologically. However, many other key industries—best examples are the flourishing consumer electronics and the car industries—have never attracted major governmental attention (ref. 8, p. 32).

The success of the latter can only be explained by competition on the domestic market, which is definitely one of the roughest in the world. This competition makes 'information' a precious commodity. Japanese companies screen piles of scientific, technical and market literature for hints about technical advances. Domestic and often foreign rivals' new models are immediately disassembled to analyze their parts. So the company engineers are as familiar with the product lines of the competitor as with their own ones (ref. 8, p. 34).

The general attitude towards information in general in the West is that scientific-technical information has no material value *per se*. In Japan scientific-technical information and other specific information is one of the basic factors needed to remain competitive. We could therefore say that information is a new 'raw material' like coal or iron ore. It only needs to be processed and turned into a marketable product. So information has a value in itself.

The role of the Japanese government

The central government traditionally plays an important role in the development of all areas of society in Japan. This role and the underlying self-confidence are respected widely by the citizens. It was the private sector, however, which had to bear the main burden for development: in the nineteenth century by all kinds of taxes, nowadays by pushing leading industries into joint large-scale development projects. Decisions on what is good for the country are made with a high degree of common consent. There is virtually no major discordant note between the great economic forces and political decision making. To give an example for this: Japan's future communication society started with the large-scale 'Tama Coaxial Cable Information System' (CCIS) 1972–1977, in which mainly the software of an all-comprising computerized communication system was tested. In a contrast R and D programme started in Osaka (Higashi Ikoma), the hardware side of the problem (optical fibre cable communication, etc.) was explored.[9] These projects were the practical consequence of the consensus reached between the government and the economic leaders concerning the necessity to push Japan forward on the way to the envisaged 'information society' or 'informatized society'.

In 1980 MITI and seven large electronics companies founded the 'Joint Research Association for VLSI Technology'. This project succeeded the preceding joint R and D projects of the years 1976–80, which had been sponsored by the government with $150 million (out of a total of $350 million). In 1982 the application of the latest generations of VLSI elements in communications was tested by Nippon Telegraph and Telephone Public Corporation (NTT), while its application in computer technology is already underway. With these activities Japan is well prepared for the era of VSLI technology, which has a prospective market of $2.5 billion in 1985 in Japan alone (according to Japanese sources opposed to $1.8 billion for the whole world according to US sources).[10]

Common to all these projects, and many others, is the involvement of the Japanese government, which provides the political framework, a minor part of the investment, and a favourable economic setting for a certain number of large companies. At the same time, however, other companies are struggling to acquire these new technologies on their own. Are they not handicapped by the privileged companies? Not at all, since the results of the joint projects are open to the public at large.

Today there is a new element in these large-scale projects. Foreign companies and governments are invited to participate. In the light of Japanese success on the one hand and growing foreign protest against Japanese advanced products on the other hand, Japan is gradually recognizing technological and economic development as a matter not only of national but of global dimensions.

As already mentioned the present-day role of the Japanese government in the development of the nation should, however, not be overrated. As a corollary of 'sustained development' on a broad scale throughout the country, its former predominant role even seems to be diminishing.

The role of visions

'In Japan's industrial policies, visions are considered the basis for policy measures. There are various kinds of visions: some cover overall industrial structures, others relate to certain segments of industrial structures or specific problems such as energy and industrial adjustment. And there are also visions called 'regional visions' which deal with the development of regional economies'.[22]

Such visions are not formulated by the government alone. They are formulated through open discussions of councils composed of representatives from various quarters, including not just industries but also financial institutions, academia, journalism, labour, small business, consumers and local public entities. Daily exchange of views with corporate managers, careful analysis of industries and industrial structure, and opinions from the press form the basis of discussions. It should be emphasized that this process of council deliberation guarantees the openness of policy planning.[22]

A vision has the following functions:

1. *Presenting in a well-arranged form useful information pertaining to the industrial structure, and indicating the basic direction of medium-*

or long-term policy. Thus uncertainties inherent in the market economy can be decreased so that private enterprises may demonstrate their viability more fully. In this connection, the Organization for Economic Co-operation and Development (OECD) pointed out in a report on Positive Adjustment Policy (PAP) that abrupt policy changes or uncertainties about the direction of government had obstructed the vitalization of private enterprises in some countries in the West.

2. *Providing a source of useful information that may be utilized by businesses in formulating their strategies*. However, it is entirely up to them to interpret or utilize a vision. A vision does not indicate corporate strategy, which must be determined by each individual corporation on its own responsibility.[22]

A good example for this is MITI's 'Industrial Policy Vision for the Eighties'[39] conceived by the Industrial Structure Council (ISC), which is typical of the above-mentioned councils.

Foreign governments and parliaments do, of course, issue reports which seem to be similar to Japanese policy visions. In most cases, however, they lack the broad basis of discussion before publication. The Japanese visions in general are already widely accepted by individual and corporate decision makers at the point of their publication. Like the 'white papers' (see p. 50) they are supplemented by various follow-up publications on various levels explaining and illustrating their contents.

This is also the case with the Report of the Committee for Information Industry of ISC of 1981,[31] which was made available to the general public in a more elaborate and illustrated version.[38] The annexes of the latter are a very useful compendium of tables and figures, graphs and illustrations, which renders the highly complex matter visually understandable to a wide public. The low price (of little more than $5) indicates a high distribution.

Domestic co-operation in R and D

Despite fierce domestic competition there exist a lot of co-operational ties developed within and between the public, academic and private sectors at all levels.[18] In many cases these are rather loose ties on an ad hoc basis to solve pending problems. But often projects gradually develop into new private enterprises or semi-public institutions, which add to competition in the respective field. On the other hand such co-operational ties ease excessive competition. They account for a socio-economic framework, where brutish 'shootout' on the market is considered to have disharmonizing effects and to be shortsighted as far as development as a whole is concerned. Domestic co-operation in R and D—even *without* governmental involvement—contributes largely to industrial development in Japan. Here, too, the bulk of the financial burden of R and D is borne by the private sector.

The whole system—which actually is more a code of practice governed by rational and pragmatic considerations—probably accounts for the high performance (success against investment) of Japanese industry and trade which can be evaluated and measured in material benefits. It must be clearly pointed out that in the light of the above observations R and D has attained a dynamic force of its own, which has become largely independent from governmental guidance.

Negative side-aspects of economic development

There is an alarming increase of negative side-effects of economic development—like the increase of school-phobia, of juvenile delinquency, etc. 'Regarding Japan's social fabric there are signs of fraying at the edges. Alcoholism, nervous diseases, divorces and cases of individuals totally absconding from society—a phenomenon known in Japan as *joohatsu* (evaporation)—are all on the increase.[3] At the same time a change in traditional ideals and values can be noted, however subtle. There are symptoms of what the Japanese refer to as advanced-country disease, namely a hardening of spiritual arteries, a gradual loss of motivation and direction, a sense of futility, all of which are compounded by growing individual greed at the expense of dedicated self-sacrifice to a common cause'.[22]

On the one hand the Japanese society is aging due to longer life expectancy. On the other hand young people would like to lead a more individual way of life. In a few years this could bring about social conflicts. To put these observations into perspective, figures for the above phenomena are still small—indeed miniscule—compared to standards in the US or in European countries. Japan has been used to rapid cultural changes since ancient times. At present it even seems as if most of the above negative aspects even foster the 'informatization' of Japanese society.

Information in Science and Technology

Japan—an 'Eldorado' for information

There is hardly any country in the world, where more information per capita is published *and* read. About 125 daily newspapers sell sixty-eight million copies (morning editions alone) every day making the Japanese the world's most devoted newspaper readers (with a reader ration per sold copy of nearly 60 per cent—compared to England and the Soviet Union with 40 per cent each). The biggest newspaper of the world is the *Yomiuri Shinbun* with a morning and evening circulation of 13.6 million reaching 38 per cent of Japan's 34 million households.[12]

Today Japan is one of the leading nations in the field of the publication of scientific-technical literature. Of a total of 28,000 journals, 9,000 deal with the 'hard sciences', 700–800 with the humanities. There is an increase of over 10 per cent in new titles (books and articles) annually in the field of information showing the importance which the Japanese public attaches to this field of knowledge.

Among the book publications, government and government-related (sponsored, ordered, etc.) titles account for a remarkable 50 per cent (1977: 16,000 out of 30,000 titles). A 1983 catalogue of government publications lists about 4,300 titles issued by ministries and government-related agencies and institutions.[43]

In the field of information and systems engineering (including computer hardware and software, industrial engineering, automation, operations research, electronics, quality control, data processing, programming, etc.) 1982 shows about 2,000 titles of serious publications on sale issued by about 120 publishers dealing mainly with this subject. This means another increase of more than 10 per cent compared to the figures of 1981 (refs. 9 and 10).

Japan is a veritable paradise for manuals, handbooks, dictionaries, directories and all kinds of other reference material. A 1981 directory on dictionaries and encyclopedia lists 4,436 titles[9] (an increase of 822 compared to the 1977 edition—or 5 per cent per year, including only pure reference works of considerably high standard and not including the whole range of indexes, monthly reproductions of newspapers, statistics, training references, directories of names and institutions, etc.). The figures for 1982 are 6,092 showing an increase of 1,656 titles over the year before.[32]

The I and D 'strategy'

Strictly speaking the Japanese 'I and D strategy' is not really a 'strategy' but rather another one of the above mentioned visions, enforced by development and market necessities. How did this vision come into being?

The stages of post-war development of I and D. After the Second World War the institutional development in I and D in Japan started very slowly. It took place under the guidance of the Ministry of Education, Science and Culture (MESC) which is responsible for the entire educational system. In the seventies the development suddenly gained momentum. The function of pace setter was passed on to institutions under direct control of the Prime Minister together with those linked to MITI and finally to private enterprise. Let us review the stages of development:

Stage I (1948–57): In that stage many of the now leading institutions in I and D were founded. In 1948 the National Diet Library (NDL) was established, which supervised the setting-up of libraries according to the 'Library Law' (1950). In 1956 the 'Science and Technology Agency' (STA) was implemented as the main advisory institution to the executive for planning and co-ordination in the field of science and technology. The year 1957 saw the establishment of the 'Japan Information Centre for Science and Technology' (JICST), a special non-profit making organization which was placed under the guidance of STA.

Stage II (1958–69): In retrospect, those years were a period of transition. Expenditure for R and D rose at an impressive rate. Since 1965 the amount of data in science and technology (primarily bibliographical data) had increased sharply. As a consequence the 'Council for Science and Technology' (CST), an advisory institution to the Japanese Prime Minister, started work on a 'National Information System for Science and Technology' (NIST).

Stage III (1969–72): With the 'Basic Measures Concerning the Flow of Information in Science and Technology' of October 1969, a new era of development began. During those years a total of 150 research projects were adopted and carried out. There was, however, not much communication, i.e. interaction between the research groups, unlike later stages where several research groups were organized under a common sub-theme.

In the 'White Paper on science and technology 1970' one of the main foci was the situation regarding I and D in Japan. The backwardness in this field and all kinds of difficulties and drawbacks were pointed out frankly. At the same time this open analysis also provided the framework for future development. It explained the necessity of the programme for a 'National Information System for Science and Technology' (NIST) founded 1969 and claimed the legitimacy of the government to take the lead in the development of I and D in Japan.

Besides that the Report 'Technological Strategy for the Communication Society—a Systems Engineering Approach to the Development of Economy and Society' was published in 1970. In this report seven focal areas were postulated for the seventies, one of which explicitly deals with the communication and information system. Some others included I and D activities.[9] The role of the government was defined as guarantor for

— the welfare of the nation
— technological progress
— a highly dynamic and flexible information society
— the avoidance of negative development (e.g. pollution)
— international relations
— other factors

Principles of decision making were expounded, taking into consideration aspects of social engineering, systems engineering, cost, regional planning, etc. Since then Japan has *systematically* developed a *systems approach* to all fields of society and of course I and D, too. Top priority with respect to I and D was assigned to:

— the development of high-capacity large computer units
— the development of information retrieval techniques and of an information referral system
— the development of information transmission technologies
— the development of a nation-wide system for information technology
— the development of software for I and D purposes
— the development of electronic elements for information technology.[9]

Seven keys were proposed to reach this aim, amongst which three dealt with information (e.g. think tanks), one with new forms of international cooperation and the rest with training and education in science and technology. In the above two crucial documents one can find the vision that guides the subsequent development of an 'informatized' society in Japan. As a result of efforts during that stage, the need for further research on information science was clearly recognized by researchers and administrators alike, and this need provided a great driving force for advancing research in the next stage.[9]

Stage IV (1973–75): In February 1973, a 'Standing Committee for Information in Science and Technology' was called into being, which revised and reformulated NIST in close collaboration with the sixteen ministries concerned. Having learned the lesson of the previous stage, projects were carried out in four research groups, which were supervised and co-ordinated by a liaison group. The work of these groups was linked by the following sub-themes:

1. networks (computer networks, high-speed data circuits, data transmission, etc.)
2. man-machine interfaces (online terminals, design of image processing systems, generalized interactive languages, etc.)
3. utilization of science information (bibliographic information dissemination systems, information retrieval, etc.)[25]

One of the five focal tasks of NIST was to expand the 'Japan Information Centre for Science and Technology' (JICST) into the head organization for documentation, computerization, storage, retrieval and commercial exploitation of all accessible data in science and technology. At the same time, however, the function of JICST was redefined into a kind of general information centre for 'general specialized' data in contrast to previous ideas of a centre for 'special specialized' data.

The activities at that stage (among others the project 'Advanced Information Processing of a Large Amount of Scale Data over a Broad Area' 1973–75, yielded the following results:

1. The methodology applicable to more comprehensive research and development on information systems was developed and established.
2. The question of how the information system ought to be defined was recognized as a very concrete problem, and the basic technological foundation was established to bring the system into being.
3. The standardization required for networks was largely achieved.[25]

In August 1974 the following functions and elements were assigned to NIST in order to assure its implementation:

1. central co-ordinating function
2. clearing-house(s)
3. data centres (including data bank producers)
4. special information centres
5. general information centres
6. regional service centres
7. a central depository
8. terminal service points

The following were added later:

9 training institutions
10. R and D institutions[9]

Stage V (1976–78): During those years I and D activities were concentrated on research concerning input, accumulation and retrieval of 'science information' with the stated objective of promoting the development in the practical application of the results (e.g. the project: 'The Formation Process of an Information System and Organization of Science Information' 1976–78).

Education and training in information turned into an urgent need. In these years most of the specialized research institutions of the newly-founded Tsukuba University were founded or moved there. They were linked by the Tsukuba University Information System, at that time one of the most advanced information online systems in use by large-scale computer centres in Japan. In 1976 the Research Centre for Library and Information Science of Tokyo University was opened, followed by the Science Information Processing Centre of Tsukuba University in 1977.[9]

Since that stage it has been felt in Japan that all the university information centres could be linked in a nation-wide network in no time—provided the necessary funds were available. Seven large-scale computer centres for inter-university use had already been set up.

Stage VI (1979 until about 1982): 1979 brought about a breakthrough in I and D in several areas. In October the 'University of Library and Information Science' in Tsukuba offering a four-year course was opened. Thus the scholarly campus of Tsukuba developed into a model not only for I and D data processing and retrieval but also for I and D education and research.

In June 1979, 'A new plan of a "Science Information System" (SIS) in Japan' (An Interim Report) was published leading to the actual 'Report of the Science Council' under the same title in January, 1980.[25] This report openly points out the backwardness of Japanese I and D in certain areas. It defines the main areas of future efforts as follows:

(a) *Primary information* should be collected and consolidated systematically and effectively ... it is necessary to work out means for a more effective nation-wide utilization of the collected materials ... service capabilities at university libraries should be improved and reinforced substantially ... by a more appropriate management of library organizations ... and by a more reasonable centralization... mutual co-operation among libraries should be further promoted.... plans should also be made for the systematic collection and provision of new forms of primary information other than bodies or research journals.

(b) As for *secondary information* ... an information retrieval system should be organized to meet the information requirements of researchers throughout the country ... a system for cataloguing and holding information should be established as early as possible.... the interface functions between retrieval system and researcher as end user of information should be enhanced.... close functional interrelations should be established between the organizations managing the various databases and providing information services.

(c) *Database development work* should be undertaken with adequate broad co-ordination after having carefully examined the areas with a prospect for further development.... consideration should be given to fostering the role Japan should play in the shared efforts of organizing secondary information on the international level.

(d) A new *Science Information System* (SIS) should be implemented, which would work on a non-commercial basis using the idea of resource sharing. It should meet the advanced and diversified information requirements of science research in the academic community. Databases to be produced in the SIS will, unlike those in general use around the world, have highly advanced and pioneering contents.[25]

These are the idealistic views of the academic society, as presented by MESC. At the same time, however, other institutions are working fervently to achieve a more commercial application of I and D hardware and software. Many of these activities are carried out under the guidance of the Science and Technology Agency, but there are also many institutions which conduct research in the field of information science. in collaboration with MITI, the Ministry of Posts and Telecommunications, other government agencies and private organizations. It can be said that MESC is only one leading factor among others in the development of I and D in Japan—and it is probably not the most active one.[9]

The information technology since the beginning of the eighties. The present stage of development started around 1982 and can probably be characterized best by the development of technology in this field. At the end of that year an exhibition of hardware and software to be used for I and D activities called 'Database Fair '82' was organized by the Japanese Society for Documentation (NIPDOK) in Tokyo. It clearly revealed that Japanese companies are catching up quickly. In the near future the results of the present large-scale build-up of production facilities for VLSI circuits will become evident. In the mid-eighties major breakthroughs in computer technology (hardware and software) can be foreseen accompanied by further miniaturization of main components. Probably in a few months the Japanese I and D market will offer inexpensive *and* highly sophisticated equipment hitherto unknown.

At the same time substantial headway has been made concerning the development of software production systems. It can already be foreseen that Japanese software producers will corner the market by '100 per cent quality control' in software. Japanese users claim a high reliability in software as well as in hardware. The attitude in Japan is that software produced by professionals should have no bugs, since bugs are defects in the product; reliability of a product is considered reliability of the maker as a whole.[34] Another very important aspect of future I and D industry, namely the development of information network architectures in Japan, is taken into very little account in the West. Very soon more than 50 per cent of such systems in the world will probably be run by Japanese companies. Until the end of this decade Japan will be covered by a net of optical fibre cable telecommunication lines. It will then be possible to shift any amount of data from one part of the country to another any time at very low cost.

The project of the 'fifth-generation computer',[36] which is supposed to lay the basis for future 'world knowledge data banks' will add to the above mentioned development as soon as some of the sub-projects bear results. According to recent information[7] governmental subsidies from the MITI affiliated 'Agency of Industrial Science and Technology' (Kōgyō Gijutsuin) were granted in sixty-six cases in 1983 totalling 2.14 billion yen (about $9 million). Thirty-six of these sixty-six projects are extensions of running ones, while thirty new projects got initial funding. These projects were selected under the aspects of the promotion of the

- — development of new frontier technologies (thirty-seven projects covering technologies like optoelectronics, biochemical technology, etc.);
- — enhancement of the development of local/regional technologies (thirteen projects under the heading of environment preservation, safety and security measures as for instance interior detecting devices for long distance pipelines);
- — social needs and demands (seven projects ranging from the interchange of local/regional technologies to the levelling-up of the industrial basis in the countryside).

Eleven topics were concerned with co-operative projects between various industries and on different levels. All projects are listed together with the receiving institution or organization. Among the sixty-six projects at least twenty deal with computer hardware, software or related electronics, like

- — microcomputer educational systems
- — superior technology of growing large single silicon crystals
- — high speed digital image processing systems
- — low noise impact printers, etc.

Many of these projects will have direct impact on the further 'informatization' of the Japanese society.

Institutionalized activities in I and D

I and D activities are carried out mainly in three areas:

- — specialized national or public institutions
- — educational institutions and learned societies
- — private industry

The specialized national or public institutions and certain learned societies have a leading role in the development of I and D in Japan. The institutions listed in the following paragraphs together with their functions and tasks are not of a commercial (private economy) or branch-specific nature. They were selected according to four criteria:

1. They process data from the fields of natural science and technology, legal protection of industrial property and standardization.

2. Their expenses are covered by public funds and not *primarily* by commercial funds.
3. They also carry out services with secondary and tertiary material.
4. They are of special significance in the establishment of the field of information and documentation in Japan.

In spite of fierce competition among the Japanese I and D institutions, Japan is obviously at present succeeding in enhancing development in this field in the interest of the entire nation.[9]

The Japan Information Centre for Science and Technology (JICST). The staff of JICST, which was founded in 1957 under the supervision of the Science and Technology Agency, grew from an initial 32 employees to a permanent staff of about 340 employees in 1981. JICST has international connections with the FID (Fédération Internationale de Documentation), with the ICSU-AB (International Council of Scientific Unions—Abstracting Board) and UNESCO (General Information Programme of Unesco—formerly UNISIST). It has the task of collecting, processing and offering to interested parties, as fast as possible, all available information concerning science and technology. Domestic information (not only regular publications, but also secondary information, technical reports, conference documents, patent documents, etc.) and information from about fifty foreign countries (mainly from the US, England and FRG) is obtained by JICST as rapidly as possible. The material is reproduced, displayed in reading rooms, classified, filed in archives, documented and processed into secondary and tertiary information. In 1982 JICST processed 6,610 foreign journals, 3,750 Japanese journals, 35,000 technical reports (1980), 750 conference documents (1981), 49,000 patents and other documents (1980). A selection of these materials (about 400,000 titles in 1982) made by about 100 in-house information officers is abstracted by about 5,000 external experts. The information officers with scientific and technological backgrounds then check subject contents, terminology, phrasing and bibliographic references as well as assign classification codes (modified UDC—Universal Decimal Classification Code) and keywords (based on the JICST Thesaurus). These data are processed by means of the HITAC M180 System.

JICST developed its own online computer system, named 'JICST Online Information System' (JOIS). Through this system, the data can be retrieved by means of keywords which are contained in the JICST Thesaurus. JICST also offers data of foreign data banks. In 1980 JOIS-II was implemented. It links eight regional centres thus forming an online network.[9] Another important function of JICST is that of a clearing-house for thesaurus and terminology work. July 1982 saw the start of a three-year programme of STA for the development of an automatic translation system. Within the framework of this project JICST will expand its JICST Thesaurus to a terminological data bank of between 400,000 and 700,000 term records (depending on the budget available). These terms with English equivalents will serve as the skeleton for the transfer of specialized information from English into Japanese and vice versa.[6]

Until the present, JICST information available via the JOIS system was not accessible from abroad. Starting 1984 JICST is going to provide a few selected countries (France, South Korea and probably the FRG) with the equipment and know-how to retrieve JICST data directly online.[5]

The Japanese Society for Documentation (NIPDOK). NIPDOK was founded in 1950 as a successor to the UDC Society of Japan and has the status of a non-profit and private organization. Similar to JICST, NIPDOK is also under the supervision of STA. It is composed of corporate and individual members. Among its member institutions there is, for example, JICST. As of August 1982 the membership has grown to 300 organizations and 800 individuals.

The most important publications of NIPDOK are *Dokumentêsyon Kenkyû/Journal of the Japan Documentation Society* and a new scientific journal on microfiche *Informant.* The gradual translation of the Universal Decimal Classification (UDC) into Japanese, is one of its prominent tasks. In 1983 the revised third edition of the book *Science Information in Japan* is going to be published (in English). NIPDOK also functions as a clearinghouse for the standardization of terminology in the field of I and D. In this connection, it works together with ISO/TC 46 on the international level and with JICST in the domestic area.

NIPDOK is also engaged in the training of documentation specialists and librarians. In the fiscal year of 1981 thirteen courses were held with an attendance amounting to 340 NIPDOK members. Annual symposia are organized, where members report on their research and other activities.

The National Diet Library (NDL). NDL is one of Japan's largest libraries. With regard to its library functions, its responsibilities correspond to those of many other national libraries. However, they far exceed the general functions of a library. Under the NDL, in co-operation with NIPDOK, rules for the standardization of Japan's complete library system have been worked out (with the exception of some large university libraries).

NDL collects and catalogues all printed material published in Japan, and foreign publications as far as possible. Its reference section has the largest number of titles in Japan. Its most important publications are the catalogues of printed materials in its holdings, which are continuously supplemented, including among others the *Directory of Japanese Scientific Periodicals,* one of the most comprehensive lists of all periodicals appearing in Japan. Its bibliographic data are all translated into English.[21]

The Japan Standards Association (JSA). JSA was founded in 1945 as a public institution under government authorization. It currently has about 160 employees and about 4,200 supporting members. In addition to the preparation and publication of Japanese standards, it has the responsibility of handling standards from more than one hundred different organizations in more than fifty countries.

For the benefit of the country, the industrial standards are co-ordinated with international as well as with foreign national industrial standards. The titles of the Japanese industrial standards are all translated into English and available in the form of the annually published *JIS Yearbook.* Quite a big number of industrial standards are translated into English. It should be pointed out that the Japanese Industrial Standards (JIS) in original Japanese are at present available only at a few places in Europe while the original standards from more than fifty countries are available in Japan.

JSA publishes its own vocabularies of standardized terminology. A recent comprehensive single volume dictionary edition containing all Japanese vocabulary standards can be considered to be produced at a most advanced level of computer-aided lexicography.[30]

The Ministry of Education, Science and Culture (MESC). MESC is trying to maintain its position in the field of information and documentation in Japan. In this connexion, two departments should be mentioned: the Unesco and International Affairs Department and the Science Information and University Libraries Division, the latter collaborating closely with the national universities. Under the supervision of MESC, a number of retrieval systems at major national universities have been established in Japan, some of which have already been linked through the joint efforts of Tokyo University, Kyoto University and NTT.

Because of the variety of systems the task of harmonizing them and of establishing the co-operation between university libraries is rendered very difficult. In addition, an information and documentation system for the acquisition of data on all research work that is being carried out is still in its planning phase, although it has been discussed for a long time. This shortcoming, as well as the various restrictions with regard to the exchange of material between the universities, does not support the co-ordination of the research tasks in the natural sciences.

The Science Information and University Libraries Division houses the Subcommittee for Terminological Research founded as early as 1947. Despite the ambitious plans for the standardization of terminology in the natural sciences and technology, about twenty-five small- to medium-size bilingual glossaries have been prepared during the years since 1954. Because of limited personnel, this body was only able to carry out a co-ordinating function. The task to compile these dictionaries was passed on to different scientific societies, which were able to compile them at their own discretion. MESC's continuous endeavours to harmonize scientific and technical terminology in Japan has nevertheless contributed largely to the high standard of lexicography in Japan.

The Japan Institute of Invention and Innovation (JIII). Founded in 1904, JIII has meanwhile grown into a large organization. It serves the field of invention in Japan in practice and helps the firms as well as the inventors to obtain suitable protection for their ideas. The Institute has branches in all regional and city administrations of Japan (a total of forty-seven), which—together with two institutes for research problems in connection with industrial legal protection—are headed directly by the board of directors.

The Institute publishes several excellent periodicals. In co-operation with the Japanese Patent Office, the data of all Japanese and of the most important foreign patents, utility models, trademarks, etc. are collected, stored and abstracted. Especially during the past few years, the Institute has published a number of excellent reference works, such as indexes, directions for application, current awareness journals, classifications, concordances, legal collections and directories for experts and laymen.

The central office of the Institute in Tokyo has 200 employees (1977), and in the whole country, the Institute employs some 470 persons who can draw upon a considerable reserve of more than 10,000 freelancers. JIII has more than 13,000 members. In addition to the information and documentation activities, the main task of the Institute is the use of the existing and stored data to further activities in the field of invention and innovation in Japan. JIII therefore organizes inventors' fairs and invention competitions (even in schools), co-ordinates the R and D efforts of individuals and private firms and has extensive instruments for actively furthering invention activities.

The Japan Patent Information Centre (JAPATIC). JAPATIC was founded in 1971 during an extensive reform of the patent examination and publication sector with the active support of JIII. JAPATIC is developing more and more into an institution that collects and processes all relevant patent data within the shortest time possible, stores them on microfiche, abstracts them, and offers them to interested parties in the form of various research and translation services. A joint Patent Data Online Retrieval System (PATOLIS) has been operative since mid-1979 with the assistance of JIII. Today's PATOLIS can even store and retrieve image data. Information on 400,000 national and foreign patents is collected and processed in close co-operation with the US.

Small Business Promotion Corporation (SBPC). There are a number of other institutions that also deal with information and documentation, but not exclusively. One of the most important ones is SBPC in Tokyo. It was created in 1967 by special law, recognizing that medium-sized and small businesses would have an increasingly difficult future due to domestic and international competition. It was conceived as a clearing-house within a network of information centres, and was to furnish not only technical-scientific information, but also general and special marketing information and advice concerning financial support.

SBPC is a unique tool for the Japanese government to curb unbalanced development due to 'big-science' and national large-scale R and D projects. It can be regarded as a regulator for industrial competition. Although MITI generally regards small and medium enterprises only as of 'regional' importance, actual economic development tells a different story. These enterprises can be regarded as a reservoir of industrial restructuring and adjustment. Especially in the field of computers and so-called 'new materials' some of the companies achieved incredible success accompanied by stupendous growth. Highly modernized small and medium enterprises will play an important role in the further development of decentralization of industries in Japan, thus increasing the standard of living and laying the basis for a higher rate of consumption also in rural Japan.

Organizations in the field of librarianship. The Japan Library Association (JLA) is a professional organization of libraries in Japan. At present, membership stands at about 5,000. JLA is also engaged in training in I and D for libraries.

The Special Libraries Association (JAPAN SLA) plays an active role in the development of I and D in Japan. More than 500 institutions and libraries are organized in this Association. The National Diet Library is playing an important role in the management of the Association.

Other organizations. There are quite a few information centres specialized in one area of science and knowledge each. Some of them are:

(a) Japanese Medical Abstracts Society
(b) Medical Information System Development Centre (MEDIS)
(c) International Medical Information Centre (IMIC)
(d) Japan Pharmaceutical Information Centre (JAPIC)
(e) Society of Automotive Engineers of Japan
(f) Japan Association for International Chemical Information (JAICI)
(g) Japan Atomic Energy Research Institute (JAERI) Nuclear Data Centre
(h) Japan Science Foundation (JSF)
(i) Railway Technical Research Institute

I and D in private industry

Until about 1970 intra-company I and D activities and equipment in Japanese private industry lagged far behind the US model. Since then big enterprises—especially the Japanese-style multinational corporations—have caught up considerably (e.g. Ajinomoto).[9] Trade companies like Mitsubishi make use of quite sophisticated information systems.

As data processing costs have decreased considerably compared with fairly stable costs for data transmission, many companies utilize decentralized data systems. This has led to a relative reduction of transmission costs on the one hand and higher efficiency, higher status and higher creativity of the place (and person) of actual application on the other hand. As the utilization of personal and microcomputers as online terminals is becoming commonplace, the use of database services is bound to increase. The availability of such services gives added impetus to office automation.

At the same time companies are beginning to view their libraries and information services as possible profit centres, providing trend studies, computational functions and the analysis of assorted information. Quite a few Japanese firms have been striving to apply database management-systems technology to their own collections of data to produce in-house databases. Besides that and not coincidently, Japan has become a principal market for foreign vendors of huge databases, a fact which is already having a considerable influence on the Japanese information industry. There are fears in some quarters that this influence could thwart the development of a healthy domestic database industry.[2]

Education and training in I and D

Since 1967 research institutions specializing in the study of information science within a university framework have been established. They amount to some thirty-eight departments in information science set up within the faculties of science and engineering around the nation in 1979, training nearly 2,000 students per year. But the curricula of these studies vary to such an extent that they are barely comparable. Three years earlier there were only twenty-nine universities, thirteen of which were offering post-graduate studies and providing courses in information science to about 1,251 students. There were, however, at the same time about seventy university institutes for library science teaching about 5,000-6,000 students (graduates). Part of their curriculum contains information science, too.[9]

Besides that MITI has long since established the 'Institute of Information Technology' (IIT) in order to respond to the need for information specialists all over the country. JICST, NIPDOK and other institutions provide courses of all kinds and levels in information and documentation. Since 1980, when the University of Library and Information Science in Tsukuba started to function, there have been strong tendencies to systemize and concentrate efforts in this field.

In May 1983 the Diet voted to create nineteen more 'academic towns' like Tsukuba around Japan. These 'technopolises' shall lead the country smoothly into a 'network-type society'.[11] In the course of this development I and D activities will spread resulting in a general levelling-up in this field.

Unbalanced development of the information sector comparing Europe and Japan

The situations seen through Japanese eyes

The current tensions bedevilling relations between Japan, the US and Europe are more than just economic. Since the mid-nineteenth century the Japanese have taken up the challenge of competing with the West on Western terms. They consciously chose to define themselves according to Western values. This choice still stands—today without the Pan-Asian ideology—and remains the source of Japan's equivocal relationship with the rest of Asia to the present day[1]. On the other hand this choice—combined with a certain inferiority complex regarding the West—helped motivate Japan's successful modernization. This pragmatism survives to the present day and its force in Japanese society should not be underestimated.

The year 1968 saw the Meiji-Restoration. The old 'feudal' social and political order broke down, an event to which Europe had contributed quite a bit. A new government seized power. Hundreds of highly and sometimes less qualified 'foreigners' were put on the payrolls of the central and regional governments to reshape the whole country according to the model of the most advanced nations of that time. The vast majority of foreigners in Japan were not ready to learn the language of their 'masters'. On the contrary some of them even tried to advise the Japanese to change their national language to English. Still they were treated with respect—even when they were not needed any longer. Their wages were sometimes one hundred times higher than those of a similarly qualified Japanese. Japan thus invested a great deal of money in these 'foreign advisors' and was determined to exploit as much of their knowledge as possible for the sake of the nation.

In the end the Japanese put into practice what they had learned. After some thirty years they reduced the number of foreigners and their respective salaries and managed to get the 'unequal treaties' revised. At the same time—by winning their first armed international conflict (1894: peace treaty of Shimonoseki between Japan and Imperial China)—Japan emerged as one of the imperialist powers in the Pacific.

'During the economic depression in Europe after the First World War discriminatory quotas and high tariffs were set whose effect was gradually to close European and colonial markets to Japanese goods. ... These years of rejection by the West and the closing of its markets to Japanese goods saw an ideological "return to the East" in Japan, whose hallmark was a militant anti-Western Pan-Asianism. Indeed the war in North China was frequently justified as a legitimate search by Japan for new markets to replace those closed to them by Western protectionism ... With some justification a Japanese official writing in a 'non-official' capacity observed in 1934:

> Eighty years ago, Japan was compelled to open her door to Europe and America. Small-scale industries of Japan could not stand the competition of Western goods which were produced with superior machinery. Consequently they all ceased to exist. That is history. Japan was then told that free trade was a means whereby the common welfare of mankind was promoted. By discarding industries which did not suit her and by concentrating on those best suited to her, she has now attained that stage where some of her industries are superior to those of old industrial countries. As soon as she begins competing with them, she is condemned in the name of humanity.

Many of the arguments used on both sides ... were to be repeated in the post-war period and again after the oil shocks in the 1970s and 1980s.' (ref. 40, pp. 187–8)

Something similar to the way things went in the Meiji era happened after the Second World War. I need not recall how Japan was defeated and destroyed. The conditions under which it had to start its economic and political reconstruction were far from favourable. Again, however, Japan started to learn from America and Europe. Again, the Japanese received a great deal of unrealistic advice. And finally the result once again turned out to be typically Japanese: the whole nation learned from the victors and *invested in man.* People were trained, students and experts went abroad (a very costly undertaking at that time), foreigners were employed at high cost, etc. 'It took a number of years after the Pacific War for trade to recover to pre-war levels. For most of Japan's European trading partners this had been achieved by the mid-fifties, at which time there was also a return to the old unbalanced pattern of a large European surplus.' (ref. 40, p. 188)

In 1955 Japan entered the General Agreement on Tariffs and Trade (GATT), but several of the European countries refused to extend most-favoured nation treatment to her. 'The problem was that the old fears of Japan flooding European markets with cheap goods were still very much alive and it was for this reason that important restrictions had been set up even before Japanese imports had started arriving. It was also noted that the Japanese market itself was securely closed to European exports. Only by about the time when Japan was admitted as a full member of the OECD (in 1964) was it that most of the European countries agreed to dis-invoke Article XXXV, and to dismantle discriminatory quantitative restrictions against her. Even so, several countries still insisted as a quid pro quo on having a safeguard clause included in their trade agreements with Japan entitling them to take unilateral measures to stop Japanese imports in case of "emergency".

Today the number of discriminatory quantitative restrictions has been greatly reduced, but their continued existence is still regarded in resource-poor Japan, ever sensitive to such discriminations, as psychologically offensive, a stumbling block to improving EC-Japan relations.' (ref. 40, p. 189)

A report of the Commission of the EC in 1970 put its finger on the reasons for the Japanese trade surplus with Europe. Not unfair Japanese trading practices or non-tariff barriers were keeping European exports out of Japan, but, it implied, the lack of competitiveness of certain European industries as compared with their Japanese counterparts (ref. 40, p. 239). Wilkinson (ref. 40, p. 241) lists two indications for 'efforts', or their lack, in exporting to a foreign market. One is the number of businessmen taking the trouble to go to the market they wish to sell in. The other is the amount of finances head-offices are prepared to invest in overseas marketing or manufacturing. It is a fact that thousands of Japanese businessmen and bankers are stationed in the EC in more than 1,000 offices (six thousand alone from the major trading companies). Many tens of thousands go to Europe on business trips. Many of them are just keeping their eyes open for ideas or inventions to use on the domestic market in order to have an advantage over their competitors. In contrast to these figures *there are more annual visas issued to Christian missionaries from the EC to go to Japan than there are to businessmen and bankers.* These figures are self-revealing. But these are not the only indications.

The Japanese are willing to undertake efforts for the sake of enhancing their knowledge irrespective of professional benefits. Millions of children are taught English at school—often according to methods fit for studying at a feudal fief school at the beginning of last century. Lots of them continue to improve their English at private schools or with individual teachers after school hours and later after work hours. Hundreds of thousands are learning other foreign languages—like French, German, Russian, Spanish, Chinese and others—out of a feeling for a principal necessity or usefulness—even if they never have the chance to apply their knowledge. Japan thus is also an 'Eldorado' for private foreign language schools and foreigners teaching any foreign language (never mind a Portuguese teaching English). Foreign language abilities provide access to foreign knowledge/information, which—as was stated above—is a 'raw material' necessary for the welfare of the nation.

What about the situation of information on I and D systems? Perusing only one volume of *Joho Kanri/Journal of Information Processing and Management* it becomes obvious how well the respective specialized field watches the development of I and D in the West. Here a few examples from Vol. 24 (1981 04—1982 03, English translation quoted from the *Journal*):

—'On Demand Information Service' in Europe and the Information Broker Business in the United States—Changes in the Mode of Business of Information Service Activities—(Part I: No. 2, 89–109; Part II: No. 3, 204–16; Part III: No. 4, 330–41; Part IV: No. 5, 434–42).

— Scientific and Technological Information Activities in Canada—Centering around Activity of CISTI—(No. 2, 110–21).

— (Translation) EURONET Guidelines Standard Commands for Retrieval Systems (No. 7, 651–79).

—The current activities of CIB (International Council for Building Research Studies and Documentation), and Information Activities in Developing Countries of Africa (No. 8, 793–800).

— The Present European Situation of On-line Information Retrieval Services (No. 8, 775–92).

Besides that Western and Japanese systems in application are compared and analyzed. Quite a number of articles deal with forecasts, visions, perspectives and other aspects of future development.

These and other examples show that Japan uses a rather time consuming, costly, but systematic and persevering approach to overcome problems—to change unfavourable and weak situations gradually into strength.[9] In the relations with the West this approach causes some obstacles and hindrances to communication, which seem to work both ways. Foreigners have so far failed to make similar efforts to understand Japan, which has added to old Japanese prejudice toward themselves: that Japanese culture and society is too complicated to be ever understood by foreigners. This prejudice prevents the Japanese from expressing themselves and things Japanese appropriately to foreigners, which again reinforces the prejudice of foreigners that these Japanese can never be understood. It is a vicious circle.

Environmental factors favourable to the development of 'knowledge industries' in Japan

The Japanese industry today seems to be in the gravity centre of the technological development of world's most advanced industries (excluding the military complex). In particular the macrodynamics of the electronics industry is apparently following a law of technoeconomic behaviour: basic technology flows to the point of most efficient application and production. Whereas basic technology was developed mainly in the US and then transferred to Japan, where it was rapidly, efficiently and economically applied, today's leading products of Japanese industry are original, home-grown products of Japanese technology. This tendency can be observed in the field of very large scale integration (VLSI) as well as in space-technology, communications, energy research, chemical and biological engineering, mechatronics, etc.[10]

Around 1985 substantial progress in the field of office automation, of the application of new technologies in data transmission and of the development of the I and D services is forecast to converge and trigger a new economic boom in Japan. There are virtually no social obstacles—the acceptance of these developments among the Japanese is very high. At the national level the legal prerequisites for such a development are under discussion, so that political and legislative measures can be taken in time. It is not an exaggerated assumption that technological progress itself combined with fierce domestic competition as well as foreign resistance to Japanese economic success will push Japan further ahead in the direction of its long-range perspective:

'The development of a Japan, where the knowledge industry will become predominant in the total industrial structure.'

Miniaturization in the field of computer components seems to facilitate any progress in the field of computer technology, software engineering and information. The Japanese industry and economy experiences some early advantages of the information society to come. There are plans to establish centres for specialized subject field information throughout the country. Industry is prepared to provide the necessary technologies for the future computer architectures. The whole nation apparently takes it as a matter of course that Japan will take the lead in this field.

I need not elaborate on the cacophonic appearance Europe offers to a foreign I and D specialist when compared to Japan in the fields of high technology and future oriented research. In the following chapter some serious deficiencies including information shall be pointed out accompanied by proposals for improvement.

The European image of Japan

In contrast to the Japanese image of Europe, which is fairly reliable due to Japanese efforts, the European image of Japan is severely distorted. The actual transfer of information between Japan and Europe is largely the outcome of the job of professional mediators such as academic specialists, journalists or diplomats, according to Wilkinson.[40]

Concerning Western Japanologists we note that there is an overspecialization regarding language experts (ref. 40, p. 290). Reporting from Japan is in the hands of some 250 accredited foreign correspondents from all over the world. Why then is information on Japan in Europe often inaccurate and why does it appear only sporadically? Wilkinson experienced that with a handful of notable exceptions, the foreign correspondents are usually unable to speak or read Japanese (ref. 40, p. 294). They are thus severely handicapped in obtaining first-hand information and in finding a deeper understanding for their professional 'object'.

Regarding diplomacy the same author deplores the disappearance of the scholar-diplomat of former times (ref. 40, p. 296). Last but not least there is a huge gap between the numbers of European professionals—including politicians, businessmen, labour leaders, students, athletes, etc.—and even tourists—visiting Japan and their Japanese counterparts. And there is such a contrast in seeing Japanese in Europe knowing exactly what they want to see and well prepared, compared to many Westerners visiting Japan just to go and see—which side of Japan: the myth, the shock, the hypermodernism, the traditionalism? This means that they will get one of these deeply rooted one-sided images of the country but will not get to know Japan as it is.

Systematic access to Japanese information

Basic tools

If Europe is interested in Japanese information—and it should be interested in order to remain an equal partner—Japanese information in science and technology should be systematically acquired, analyzed, evaluated and used for the sake of specialized communication and technology transfer in both directions.

Sometimes information, which is relevant to Japan, is translated into Japanese and available nearly *at the time of its official publication* (e.g. GATT rules, Second Lomé Agreement, etc.). On the other hand Japanese information (viz originating from Japan *and* written in Japanese) in the fields of economics, science and technology often takes a long time and strange detours until it reaches the European user. At the same time the *percentage* of Japanese information written in foreign languages in these fields decreases gradually by about 2 per cent annually, which means an annual increase of the language barrier of 2 per cent to the disadvantage of Europe. In the following a practical approach will be described to find the tools for information on relevant publications and documents and to show how to use them in an inexpensive and efficient way.

Although there exist yearbooks and catalogues on all Japanese publications, they are cumbersome to peruse if one caters only for highly specialized information, which can be found

1. in the form of ordinary book publications
2. in specialized journals
3. in government publications and documents
4. in publications of learned societies and associations
5. in other information sources

Since I cannot cover all fields of knowledge here I will concentrate on information in science and technology.

1. Among others book publications comprise

   — books for the specialist
   — popular books
   — handbooks and other reference books

In the field of information most of the first two of these can be found in the specialized catalogue for this field called *Joohoo keiei koogaku shomokuroku/Catalogue of books on information and management engineering*[23] which is published annually at the beginning of the year and can be obtained at very reasonable cost (250 yen). Reference publications (handbooks, dictionaries, etc.) can be found under several different headings in the publication *Jiten jiten soogo mokuroku/List of dictionaries and encyclopedia*[32] which is also published annually and costs about £8 (3,000 yen in 1982). Regarding new book publications in general one could subscribe to the journal *Shuppan nyuusu/Publication News*[33] which appears three times a month (420 yen per issue) and lists the latest publications.

2. The leading specialized journals are indicated at the end of the abovementioned catalogue of information and management engineering publications. Other journals and newsletters can be found in the Directory of Japanese learned associations, which is described under item 4 below. All other relevant journals can be looked up in the catalogue *Zasshi shinbun sookatarogu/Periodicals in print*, which lists about 10,000 titles.[24]

3. Publications by the Central Government, governmental institutions, affiliated institutions or government sponsored publications, etc. can be found in the *Seifu kankoobutsu nado soogoo mokuroku/Comprehensive catalogue of government publications, etc.*[43] which is published annually. If, however, one would like to receive news on such publications earlier one would have to obtain the monthly periodical *Gekkan seifu kankoobutsu/Government publications monthly*[42] which lists the latest publications. Since such publications are often made in small numbers only it is advisable to order them as soon as they come on sale.

4. For learned societies there exists the *Zenkoku gakkyookai sooran/Directory of the learned societies of Japan*[29] which lists most of Japan's learned societies with data on their location, representatives, international affiliations, activities, publications. Many of these learned societies publish documents or periodicals in English and accept foreign membership, which is rarely made use of by European specialists.

5. There are lots of different kinds of directories and handbooks on information sources in Japan. One is even available in English: *Directory of information sources in Japan 1980.*[14] Another one provides even the addresses of the specialists for very specific matters: *Joohoogen/Information sources.*[20] It lists more than 450 individual specialists and probably about 4,500 institutional information sources of all kinds classified under thirteen headings ranging from people's lives to information sources on special qualifications.

One can dare to say that similar basic information tools exist in other fields of knowledge, too.

Information on the present and future development in the field of information

Above a small insight was given as to which tools exist to obtain the information on information. There are of course many more such reference tools on information sources. In the following I shall concentrate on the present and future development of information.

Very important for the understanding of the temporary *and* future development of Japan are the white papers issued by ministries and government agencies. 1977 saw about sixty-five titles (five of which are in English—actually only thirty are 'real' white papers) rising to about eighty titles in 1980. This increase is no doubt an indicator of a more complex and complicated social and political scene. About half of those white papers are really of importance and ought to be studied carefully by the West. Why? Unlike white papers in those countries, these do not represent a state-of-the-art report, but reflect the consensus between the leading political and economic forces on how to proceed in the future. They are guidelines, to which large companies, banks, government institutions on all levels adopt their policies.

Every white paper is followed by at least a dozen publications issued by different institutions, explaining their contents in detail to people of different backgrounds. A high percentage of these follow-up publications explain the most urgent problems and their probable (or most desirable) solutions. The next highest percentage deals with future developments and visions, which seem to be science fiction to us—but make people in Japan familiar with the future.

In the annexes to the 'White Paper on science and technology'[17] you can find the following information:

Annex 15: Special research programmes of ministries and other governmental institutions in budget year 1980 (pp. 357f.)
Annex 16: Big science programmes and R and D programmes of ministries and other governmental institutions as well as their budget for these purposes (pp. 373f.)
Annex 17: Research themes, to which funds were allocated and the amount of assistance granted (p. 383)

In the Annex to the Annual Report of the Science and Technology Agency (STA) *Kagaku Gijutsu-Choo nenpoo 24/Annual Report 24 of the Science and Technology Agency, 1980,*[15] one can find a table on special research projects together with financial details, etc. Besides that there is an overview on the most important new laws, regulations and other legal provisions concerning the field of information in Japan.

The 'vision' of MITI as regards the future of information in Japan can be studied among others in the following publications:

— *Hachijuu-nendai no tsuusanseisaku bijon/Vision of international trade and industry in the 1980s'*[39]
— *Hachijuu-nendai no tsuushoo-sangyoo seisaku/Political measures for international trade and industry in the eighties*[4]
— *Yutaka naru joohooka shakai e no doohyoo/Roadsigns towards the prosperous informatized society*[38]

The latter provides the general public with a more popularized (at least by means of layout and illustrations) version of the above vision. All these three publications are mainly based on a very thorough study (partly drawn from a Delphy type survey) carried out during the years 1970–71 and in a second phase 1974–76. The study was accompanied by extensive discussions in all groups of society, which are of relevance to the process of 'informatization'.[19]

Information available in English from Japan

The above-mentioned sources are all written in Japanese—at least in their full version. During the last years an increase in the number of 'translations' of such documents aiming at informing foreign countries can be observed. However, in almost all cases these 'translations' prove to be only a summary of the Japanese original and therefore contain only a small portion of the actual information available in Japanese. Especially MITI excels in the number of English publications. One could say: 'The more such publications—the better'. However, what is the tendency behind this development? Since there is a high demand for information in English on Japan in the West, the production of such material causes considerable costs and since Europe is not ready to take the effort to find access to all this information, Japan is gradually developing a new market for English publications on modern Japan. Because of cost involved and other factors this information cannot but be selective and selected from a Japanese viewpoint.

On the other hand there are strong pressures to increase such 'translated' information geared to foreign countries. These demands meet with the need of the Japanese society for translations from more or less all languages of the world. A survey conducted among 850 institutions and organizations mainly handling specialized translations reveals an annual output of ten million translated pages by those 142 bodies, which returned the questionnaires.[28] Among this volume of translations, 48 per cent were translations into Japanese—including 26 per cent translations from English. These figures clearly indicate the reasons why Japan is so keen on automatic translation systems at present.

If Europe does not make the effort to find ways and means for an access to Japanese information itself, it might become dependent on translations Japan, which are promising to become a billion dollar business in the near future. Apart from that Europe would lose the status of an equal partner to Japan—at least in Japanese eyes.

In the light of foreign protests, accusations and demands concerning an 'opening' of hidden information Japan has recently if reluctantly shown intentions to establish a system of PR or cultural institutions like the British Council of the UK or the 'Institut français' of France. Such institutions for cultural exchange, however, will only meet with success, if Europe is *ready and able* to try and understand and select what Japan can offer. Instead Europe and the US are pushing Japan into a direction which might turn out to become a technological boomerang for themselves.

Japanese efforts have to be especially appreciated in the light of some largely recognized facts. The Japanese language poses immense problems to an internationalization of Japanese information. Because of the pre-eminence of information on foreign literature and some English language input of Japanese information only very little information on Japanese scientific literature finds its way into Western information services. On the one hand there are still a lot of technical and other difficulties to be overcome in order to analyze Japanese literature without dropping important documents and to input these data in Japanese in Japan itself. On the other hand a complete transformation into English language databases, which address the world at large as a target market, meets with next to unsurmountable difficulties—although the necessity to contribute to the world's knowledge with Japanese information is recognized. Ultimate hope for a solution of this problem requires government assistance and co-ordination in the light of similar examples in the West (e.g. INSPEC).[41] There are obviously various internal and external 'push-and-pull factors' to develop automatic translation systems of different levels of sophistication and for various applications.

European efforts to overcome misunderstanding between Europe and Japan

Language barriers actually are a complex combination of various communication obstacles between peoples with different cultural and political heritages. In the history of the relations between Japan and the West a pattern of mutual misunderstanding has emerged, which is not at all easy to overcome on both sides.[40] It seems, however, that particularly Europe is caught in traditional misconceptions and prejudice (some positive, some negative—but ignorance prevails).

In the light of the present state of affairs it is necessary to point out possible remedies to this situation. The vicious circle in the misunderstanding and the mismatch between Western and Japanese thinking and behaviour can only be interrupted by broader scale efforts on the Western side to explore the 'Japanese phenomenon'. Therefore, the training of many specialists of different fields through fast and efficient courses in Japanese for special purposes (JSP) would be most appropriate. At the same time the promotion of contacts with Japan would increase individual motivation. After some years of broadened contacts the 'Japanese Phenomenon' would not be enigmatic any longer.

At a few places there are successful efforts as regards a solution of the problems of the 'language barrier'. May I only point out the intensive courses for JSP at the University of Sheffield under Jiri Jelinek and a project underway at the Technical University of Vienna under Dr Emmerich Simoncsics. The former provides the tools for intensive and fast language learning. The latter should be introduced in further detail, since it provides for a unique solution to finding access to information written in Japanese—without necessarily knowing very much of the language from a linguistic point of view.

Computer-aided terminological retrieval system for specialized Japanese vocabulary

The European scientist, technician or specialist of any other field finds difficulties in learning spoken Japanese and its system of writing. Of course everybody can converse in Japanese quite well after a few months of intensive training in Japanese conversation. However, one is blocked from the main bulk of information, which is available in written form. On the other hand only the specialists for Japanese studies have the time and can afford to learn those more than two thousand Chinese characters (*kanji*) together with at least two pronunciations (a Sino-Japanese *onyomi* and a Japanese *kunyomi* pronunciation) each.

In the following figure the basic problematic is illustrated:

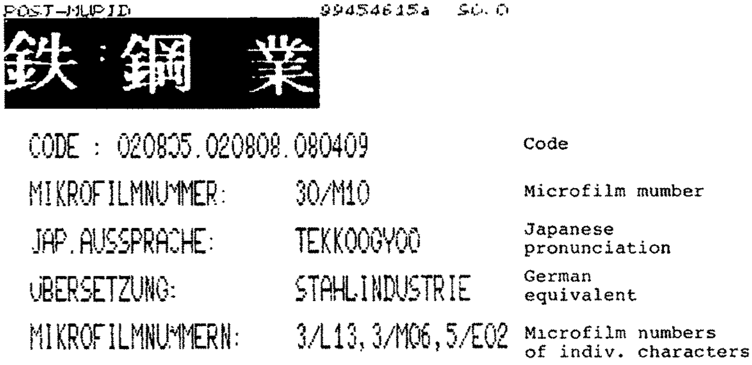
Fig. 1

KANJI	継	目	無	鋼	管	Remarks
Sino-Japanese reading	KEI	MOKU (BOKU)	MU BU	KOO	KAN	Possible combinations for reading 96
Japanese reading	tsu(gu) /tsugi/	me ma	na(i) /nashi/	hagane	kuda	
Meaning of individual characters	piece together	eye	without -less	steel	pipe, tube	
Correct reading	tsugi	me	nashi	KOO	KAN	
Meaning of term components	joint line			steel tube		
Equivalent in English	SEAMLESS STEEL TUBE					

Some Chinese characters have more than five different regular pronunciations (and meanings) and nearly all have irregular pronunciations to be used in proper names or special applications. If a Japanologist has mastered all these difficulties—a task of at least two or three years—he is not yet able to understand and probably translate highly technical texts. In the whole volume of necessary translations, however, the portion of technical or other highly specialized text is approximately 80 per cent with a tendency to increase following scientific-technical progress. In this way the Japanese writing system is the natural barrier for knowledge and technology transfer working to the disadvantage of Europe—in our case. Who would blame Japan for its language or writing system(?!)—especially since these have produced some of the finest pieces of world literature?

The above mentioned system provides access to the meaning of technical terms via a coding system for the characters, which is based on logics and aesthetics—taking into account certain traits of the historical development of the Chinese characters. Coding rules are very limited, so that they are easy to memorize both in number and as a system. They were formulated according to rules of human pattern recognition, which is by far more powerful than any electronic pattern recognition device.

Fig. 2



POST-MUPID 99454615a SO. O

鉄:鋼 業

CODE : 020805.020808.080409		Code
MIKROFILMNUMMER:	30/M10	Microfilm mumber
JAP.AUSSPRACHE:	TEKKOOGYOO	Japanese pronunciation
UBERSETZUNG:	STAHLINDUSTRIE	German equivalent
MIKROFILMNUMMERN:	3/L13,3/M06,5/E02	Microfilm numbers of indiv. characters

By using a code (primary, secondary and if necessary tertiary code) the whole term, components of it or even the individual characters can be retrieved if they are stored in the system. The system allows retrieving Japanese terminology faster than a Japanese specialist could look it up in a dictionary of his specialized field. Up to 80 per cent of a scientific-technical text consists of technical terms bound together by a grammar, which is much less sophisticated than that of common language. Thus the specialist can find access to Japanese information of his field of endeavours within a few weeks or months without necessarily having to learn the intricacies of Japanese grammar and the confusing conventions of pronunciation.

It is my firm conviction that Europe has to solve its problems with the language barriers with respect to Japan itself. Only if the West creates a situation which is favourable towards producing a few thousand specialists in many fields who are interested in Japanese information and motivated to undergo the efforts of trying to access it, and who are given the respective tools so that they become capable of doing this with efficiency, ease and relatively high-speed, can Europe expect to remain an equal partner in the knowledge and technology transfer with Japan. Europe would then of course have access to an abundance of information from Japan in Japanese and would gradually develop a 'normal' attitude towards this country—i.e. without the myth, the prejudice (whether positive or negative) and the inferiority/superiority complexes.

Conclusion

There are several indicators for the credible 'futurologist' assumption that Japan will become a giant in I and D. The 'informatization' of society is a well-accepted outlook for the future—not only the idealistic view of a few politicians and information specialists. Much of the Information Network System (INS) introduced in 1981 by Nippon Telegraph and Telephone Public Corp (NTT), which shall revolutionize data communications through extensive application of optical fibres and very-large-scale-integration (VLSI) semi-conductor technology, will be implemented by the middle of this decade already. Transmission costs will likely be one-hundredth of current costs.[10] At the same time, prices of terminal equipment are declining radically although capacity, functions and general sophistication are improving continuously. The office automation boom is but one reflection of this phenomenon.[2]

Perhaps thanks to Japan's industrial policy and definitely because of the efforts of its people and industry the balance of technology transfer has been positive with the West since about 1978 (ref. 12, ref. 16, p. 215). In the field of information transfer Japan will stay a net importer of information until about the end of the eighties due to specific development trends as stated above. Then the main stream of information could well be directed towards foreign countries in various languages, containing only a minor portion of information in Japanese.

In one of its latest white papers[37] the Ministry of International Trade and Industry (MITI) defined the Japanese role in supporting the sustained growth of world economy as follows:

1. maintain and strengthen the free trade philosophy
2. foster measures to increase domestic demand
3. achieve a smooth adjustment of the industry
4. increase international co-operation for research and development (R and D) in so-called new frontier technologies

These ideas show a global approach to the world problems (which hopefully is not only lip-service), a high sense of responsibility for world development and the readiness to co-operate. It could contribute considerably towards the solution of problems in the relations with Japan, if this new approach met with less suspicion and negative reactions, and with more understanding for the specific Japanese conditions. I am convinced that Europe still has the flexibility and the intelligence of its people to be influenced by abroad and to choose, what fits best for itself. In the case of Japan, Europe only has to take the effort to find out herself and for her own sake, what positive options Japan can offer for future development.

REFERENCES

1. AAA. The concern for steering a particularly Japanese course. *Far Eastern Economic Review* **120** (1983 06 16) 24: 56–61.
2. AAA. Database services—from slow starter to high flyer. *Far Eastern Economic Review* **118** (1982 12 03) 49: 57–60.
3. AAA. Education—jugs to be filled, not candles to be lit. *Far Eastern Economic Review* **120** (1983 06 16) 24: 80–82.

4. AAA. 80nendai no tsuushoosangyoo seisaku—Sangyoo Koozoo Shingikai tooshin [Political measures for international trade and industry in the 1980s—a report by the Industrial Structure Council]. Tokyo: 1980, 223 pp.
5. AAA. JICST kaigai e kagaku gijutsu joohoo [JICST: scientific-technical information for abroad]. *Nikkei Sangyoo Shinbun* (1983 07 04).
6. AAA. Jidoo honyaku shisutemu kaihatsu e [Towards the development of an automatic translation system]. *Nikkei Sangyoo Shinbun* (1982 07 14).
7. AAA. 66ken, 21oku 4senman-en—konnendo koogiin no kaihatsu hojokin [Yen 2,140 million for 66 projects—the R and D subsidies of the Agency of Industrial Science and Technology in the current fiscal year]. *Nikkan Koogyoo Shinbun* (1983 06 28).
8. ALEXANDER, C. P. Fighting it out—competition at home leads to success abroad. *Time* **122** (1983 08 01) 5: 32–35.
9. GALINSKI, C. Information and documentation in science and technology in Japan. *Journal of Information Science* **5** (1982), pp. 63–77.
10. GALINSKI, C. VLSI in Japan: the big leap forward, 1980–1981. *Computer* **16** (1983) 3: 14–21.
11. GOLDEN, F. Closing the gap with the West. *Time* **122** (1983 08 01) 5: 52.
12. HENRY III, W. A. The world's biggest newspaper. *Time* **122** (1983 08 01) 5: 51.
13. IGUCHI, K. Joohoo no teigi to shiyoo jittai [On the definition and actual application of 'joohoo']. *Joho Kanri/Journal of Information Processing and Management* **24** (1981 06) 3: 194–203.
14. JAPAN SPECIAL LIBRARIES ASSOCIATION (ed.). *Directory of information sources in Japan 1980*. Tokyo: Nichigai Associates, Inc, 1979, 300 pp.
15. KAGAKU GIJUTSU-CHOO/SCIENCE AND TECHNOLOGY AGENCY (ed.). Kagaku Gijutsu-Choo nenpoo 24—shoowa 55nen-ban [Science and Technology Agency annual report 1980]. Tokyo: Ookura-Shoo Insatsukyoku, 1980, 235 pp.
16. KAGAKU GIJUTSU CHOO/SCIENCE AND TECHNOLOGY AGENCY (ed.). Kagaku gijutsu hakusho 1980 [White Paper on science and technology 1980]. Tokyo: Ookura-Shoo Insatsukyoku, 1980, 417 pp.
17. KAGAKU GIJUTSU-CHOO/SCIENCE AND TECHNOLOGY AGENCY (ed.). Shoowa 56nen kagaku gijutsu hakusho [White Paper on science and technology 1981]. Tokyo: Ookura-Shoo Insatsukyoku, 1981, 397 pp.
18. KAGAKU GIJUTSU-CHOO KEIKAKU-KYOKU/SCIENCE AND TECHNOLOGY COUNCIL PLANNING OFFICE (ed.). *Kenkyuu kaihatsu renkei benran* [*Handbook of co-operation in research and development*]. Tokyo: Gijutsu Kiyo Kenkyuukai, 1979, 506 pp.
19. KAGAKU GIJUTSU-CHOO KEIKAKU-KYOKU/SCIENCE AND TECHNOLOGY COUNCIL PLANNING OFFICE (ed.). Gijutsu yosoku hookokusho [Report on technological forecasts]. Tokyo: 1982, 631 pp.
20. KODANSHA (ed.). *Joohoogen* [*Information sources*]. Tokyo: Kodansha, 1981, 828 pp.
21. KOKURITSU KOKKAI TOSHOKAN/NATIONAL DIET LIBRARY (ed.). *Nihon kagaku gijutsu kankei chikuji kankoobutsu mokuroku* [*Directory of Japanese scientific periodicals*]. Tokyo: National Diet Library, 1979, 1330 pp.
22. KONAGA, K. Industrial policy: the Japanese version of a universal trend. *Journal of Japanese Trade and Industry* **2** (1983) 4: 18–23.
23. KOOGAKU SHOMOKUROKU KANKOOKAI (ed.). *Joohoo keiei koogaku shomokuroku* [*Catalogue of books on information and management engineering*]. Tokyo: Koogaku Shomokuroku Kankookai, 1982, 144 pp.
24. MEDIA RISAACHI SENTAA KK. (ed.). *Zasshi shinbun sookatarogu* [*Periodicals in print—Vol. 1 Japan*]. Tokyo: Media Risaachi Sentaa, 1979, 858 pp.

25. MINISTRY OF EDUCATION, SCIENCE AND CULTURE (ed.). A new plan for a 'Science Information System' (SIS) in Japan. Tokyo: Ministry of Education, Science and Culture, 1980, 8 pp.
26. MINISTRY OF INTERNATIONAL TRADE AND INDUSTRY (ed.). The industrial structure of Japan in the 1980s (summary)—Future outlooks and tasks. Tokyo: MITI Information Office, 1981, Background Information BI-44, 110 pp.
27. MINISTRY OF INTERNATIONAL TRADE AND INDUSTRY (ed.). Vision of the small and medium enterprises and their policy direction in the 1980s. Tokyo: MITI Information Office, 1980, Background Information BI-43, 55 pp.
28. NIHON DENSHI KOOGYOO SHINKOO KYOOKAI/JAPAN ELECTRONIC INDUSTRY DEVELOPMENT ASSOCIATION (ed.). *Kikai honyaku shisutemu no choosa kenkyuu [Surveys and studies on automatic translation systems]*. Tokyo: Nihon Denshi Koogyoo Shinkoo Kyookai, 1982, 281 pp. publ. no. 57-C-438.
29. NIHON GAKUJUTSU KAIGI JIMUKYOKU/EXECUTIVE OFFICE SCIENCE COUNCIL OF JAPAN (ed.). *Zenkoku kyookai sooran [Directory in the learned societies of Japan]*. Tokyo: Ookura-Shoo Insatsukyoku, 1981, 683 pp.
30. NIHON KIKAKU KYOOKAI/JAPANESE STANDARDS ASSOCIATION (ed.). *JIS koogyoo yoogo daijiten [JIS large dictionary of industrial terms]* Tokyo: Japanese Standards Association, 1982, 1788 pp.
31. SANGYOO KOOZOO SHINGIKAI JOOHOO SANGYOO BUKAI/COMMITTEE FOR INFORMATION INDUSTRY OF THE INDUSTRIAL STRUCTURE COUNCIL (ed.). Tooshin [Report]. Tokyo: MITI, 1981, 144 pp.
32. SHUPPAN NENKAN HENSHUUBU (ed.). *Jiten jiten soogoo makuroku [List of dictionaries and encyclopedia]*. Tokyo: Shuppan Nyuususha, 1982, 386 pp.
33. SHUPPAN NYUUSUSHA (ed.). *Shuppan nyuusu [Publication News]*. (Three issues per month.)
34. TAJIMA, D., *et al.* The computer software in Japan. *Computer* **14** (1981) 5: 89–96.
35. THARP, M. Goodbye, Japan Inc. *Far Eastern Economic Review* **120** (1983 05 26) 21: 84–86.
36. TRELEAVEN, P. C., *et al.* Japan's fifth-generation computer systems. *Computer* **15** (1983) 8: 79–88.
37. TSUUSHOOSANGYOO-SHOO/MINISTRY OF INTERNATIONAL TRADE AND INDUSTRY (ed.). Shoowa 58nenban tsuushoosan hakusho—sekai keizai sono jizokuteki seichoo e no jooken [White Paper on international trade and industry—world's economy: prerequisites for sustained growth]. Tokyo: Tsuushoosangyoo-Shoo, 1983.
38. TSUUSHOOSANGYOO-SHOO KIKAI JOOHOO SANGYOO-KYOKU/MACHINERY AND INFORMATION INDUSTRIES BUREAU OF MITI (ed.). Yutaka naru joohooka shakai e no doohyoo [Roadsigns towards the prosperous informatized society]. Tokyo: Konpyuuta Eejisha/Computer Age Co., 1982, 211 pp.
39. TSUUSHOOSANGYOO-SHOO SANGYOO KOOZOO SHINGIKAI/MITI INDUSTRIAL STRUCTURE COUNCIL (ed.). 80nendai no tsuusan seisaku bijon [Vision of international trade and industry in the 1980s]. Tokyo: Tsuushoosangyoo Kankookai, 1980, 360 pp.
40. WILKINSON, E. *Misunderstanding—Europe vs. Japan.* Tokyo: Chuokoronsha, Inc., 1982, 313 pp.
41. YAMAMOTO, T., *et al.* Deetabeesu—sakusei, ryuutsuu, riyoojoo no kadai/Data base—Problems on production, circulation and utilization. *Joho Kanri [Journal of Information Processing and Management]* **24** (1981 10) 7: 627–650.
42. ZENKOKU KANPOO HANBAI KYOODOO KUMIAI (ed.). Gekkan seifu kankoobutsu [Government publications monthly].
43. ZENKOKU KANPOO HANBAI KYOODO KUMIAI (ed.). Seifu kankoobutsu nado soogoo mokuroku [Comprehensive catalogue of government publications, etc.]. Tokyo: Zenkoku Kankoo Hanbai Kyoodo Kumiai, 1983, 258 pp.

Discussion

SESSION ONE

J. Woolston

Question: R. A. Wall Loughborough University of Technology. The speaker said that help should be given to under-developed countries by the developed, without undermining the benefits accruing to developed societies from their own efforts. This would be a nice compromise indeed, and I should be glad to hear of some ways in which it might be achieved.

Answer: I think that this was effectively answered in my paper. Within AGRIS, each country contributes what it can, and all entries are available to all participants. This does not prevent entrepreneurs from operating. Does that answer the questioner's point?
R. A. Wall: To a large degree, yes, but not entirely. I do not think however that there is a completely satisfactory answer.

Question: H. Hannam (Foreign and Commonwealth Office). Would the co-operative information systems recommended by the speaker be of significant benefit to Third World countries: I suggest that these countries need to develop their own information systems to meet their specific needs. It seems that the co-operative database services could be of more use to industrialized than to developing countries.

Answer: I would give you the example of Egypt. Egypt has a large agricultural sector, within which there is a considerable amount of research. Before AGRIS, there was no attempt made to collect and share information on Egyptian agriculture. They are now seeing the benefits, as AGRIS can be searched to provide national output. There is now an Egyptian National Bibliography of Agriculture, developed from AGRIS.

Agris helps contributing countries to 'get their own houses in order', and provides a guaranteed and stable methodology for input, searching, and so on.

Question: F. J. Wangati (Kenya National Council for Science and Technology). Considerable information is published in journals in developed countries that is relevant to or relating to research carried out in developing countries. In view of the cost of journals, it may be possible to establish markets for specialized packages of such information which may be cheaper and more saleable than journals. Western literature derived from Third World work is often not available in the Third World because of the cost of the journals.

Answer: The specialized analysis centres within AGRIS will be able to re-package and redistribute back to the Third World, their own input and other relevant literature. AGRIS gives each country access to literature about itself.

C. N. J. Rosendaal

Question: F. Tait (BBC). Are there any prospects of standardization of access to databases in Europe? Access to American databases is possibly easier than to European ones.

Answer: There are 40 hosts, with many different command languages. I think that the European Host Organization should take this on. I feel that the users needs are being submerged by nationalistic and commercial pressures.

Question: D. A. Lewis (Aslib). .I am very impressed by the convergence currently being seen in the technologies, i.e. word processing, data processing, information processing and retrieval, and the divergence in philosophies, policies, and practices I see as described by the speaker, on the European scene.

In Aslib we have invented 'opportunity management' which is concerned with maximizing opportunities, both those which are there to be grasped, and those which may be created. In the light of the speaker's comments, particularly with regard to the private vs. public sector tension, I would suggest that the CEC's task is 'to create an environment in which the information resources may be effectively exploited for the benefit of the Community.' What practical steps are being taken by the GEC to create this environment and achieve its overall objective?

Answer: The Commission tends to support individual projects. The Council is proposing to spend 1 billion ECUs over the next 6–7 years in this area. Compare that with the $1 billion plus per year which IBM spends on Research and Development.

The Council call for proposals will ensure economic viability, 'user friendliness' of information technology related projects, and also work towards more coherent patterns of services and products.

C. Galinski

Question: S. Maesono (Aoyama Gakuin Women's Junior College, Tokyo). I much appreciate Mr Galinski's paper, because he has a thorough grasp of the Japanese situation.

I would like to say one thing about Japanese special libraries. Most are not using such things as databases yet—only a few significant libraries use them. Most are at the manual stage of processing information, although there is much thinking and planning taking place.

In Japan there are many problems to be solved. One of them is the complexity of the written language. The Japanese National Diet Library is addressing many such problems. They have a plan to release the so-called Japan MARC system in the next year. So, soon, many special libraries will introduce the terminals and will become familiar with machines, triggered by the NDL, and will gradually begin to use databases. (I think though that this may be delayed by the construction of the new NDL building.)

Anyway, most Japanese organizations, including companies, are coming to recognize the importance of information and knowledge, as Mr Galinski has reported.

Answer: There are certainly areas of backwardness, but the pace of development is very rapid and intense.

Question: P. Majorcas-Cohen (CEC, Brussels). In view of Mr Galinski's comments that Japan was a net importer of information and would remain so until the end of the eighties, after which the West might become the net importer from Japan, is there not a danger that a great deal of time and effort could be expended unnecessarily on collecting and translating papers and reports in Japanese, whose origins are in the Western literature? Europe could be buying back its own information.
Answer: Yes, I think that this is quite likely to happen.

Butterworths Guides to Information Sources
Information Sources in the Medical Sciences
THIRD EDITION
Edited by L T Morton, FLA
Consultant Librarian, British Postgraduate Medical Federation
S Godbolt, BA, FLA
Librarian, Charing Cross Hospital Medical School

Previous editions of this important reference were published under the title *Use of Medical Literature.* This new edition has been thoroughly revised to include details of recent biomedical literature and the development of mechanized sources of information since the last edition appeared in 1977. Three new chapters deal respectively with audio-visual materials, general practice literature, and sources of information for patients and public.

The book has already proved of the greatest value to clinicians and research workers, particularly those moving to a new and unfamiliar field. The new edition will be an essential addition not only to medical libraries but also to the reference sections of university, college, and public libraries.

Hardcover 544 pages 216 × 138 mm 0 408 11473 8 £38.00

Available from your usual suppliers or direct from the publishers.

Butterworths, Borough Green, Sevenoaks, Kent TN15 8PH

Library and Information Networks in Western Europe

Jack Burkett

There are so many different kinds of organisation — national, regional, and international — active in every subject field and creating a vast amount of new and modified information, that a need exists for guidance in the face of this complexity. Even within some large international organisations, particularly those which have their component divisions geographically scattered, not everything is known by the employee about the body within which he or she works. It was to satisfy this need that the author prepared the present survey, following the style of his earlier publication *Library and Information Networks in the United Kingdom* (Aslib, 1979).

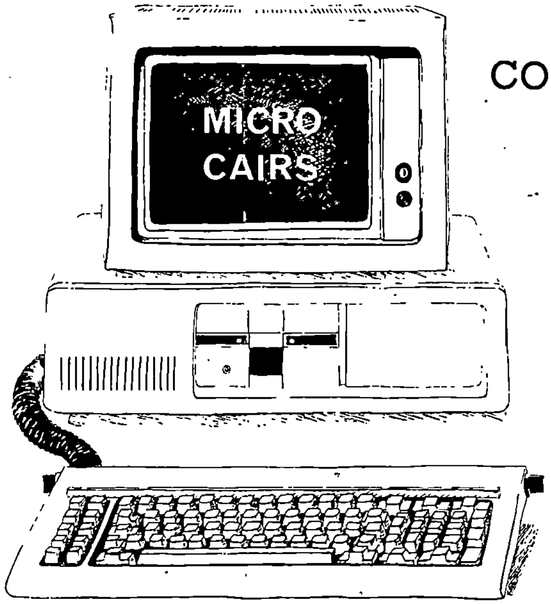
Throughout the international scene, in every discipline and profession, there exists collaboration in activities that engender information. So we arrive at *networking*, a concept that implies connectedness, co-operation, resource-sharing, and relationships at different levels: individual, group, institutional, etc.

There exist many kinds of information network, ranging from information transfer through committee meetings, conferences, seminars and workshops, to computerised database systems. Most organisations, especially the larger ones, use both the people-based systems and the machine-based systems. The present volume deals comprehensively with all of these elements of the international network scene.

ISBN 0 85142 168 7 1983
UK £11 (£9.50 Aslib Members)
Overseas £13 (£11 Aslib Members)

Aslib Publications
3 Belgrave Square
London SW1X 8PL

MICRO-CAIRS



A
COMPLETE SYSTEM
FROM £5,395

Including software, 10 megabytes of storage, keyboard and monitor.

FREE TEXT INFORMATION MANAGEMENT SYSTEMS

Options include:

- User Defined Database Structure
- Versatile Indexing, From Free Text to Manual
- Retrieval, Incorporating AND, OR, AND NOT, Right Hand Truncation, Multilevel Nesting
- Thesaurus With, Greater, Narrower, Related, Macro And Scope Note Systems
- Vocabulary Validation Through Stop List, Thesaurus, Decode Systems
- Report Generation Including Forms and Standard Letters
- Multilevel Sorting And Printed Index Facilities
- Interface To Word Processing

MICRO-CAIRS is now available for the IBM-PC, ACT Sirius and others. For further information contact:

Dr D.M. Marrable
Leatherhead Food R.A.
Randalls Road
Leatherhead KT22 7RY
Surrey U.K.

Tel: (0372) 376761
Telex: 929846

LEATHERHEAD
FOOD R.A.

INFORMATION GROUP
SERVICES

Aslib

Proceedings

VOL. 36 NUMBER 2 FEBRUARY 1984

56th ASLIB ANNUAL CONFERENCE

INFORMATION FOR NATIONAL RECOVERY: NEEDS—RESOURCES—TECHNOLOGY

Session 2: Information workers, information industry: a pattern of interests?

Special libraries and information services and the development of the UK information industry 61
Harry East

The intermediary today and tomorrow 79
Pauline Duckitt

Information in local government: challenge and opportunity 87
T. D. Wilson

User education in the online age 96
Ray Lester

ISSN 0001 253X

ASLIB PROCEEDINGS

Volume 36 FEBRUARY **Number 2**

Aslib Proceedings carries papers given at Aslib meetings and conferences, and contributed papers of interest to practising professionals. These describe innovations in information management techniques, applications of existing information products and services, and case studies of information units and special libraries. The contents of the journal are reviewed by an editorial board.

Aslib Proceedings is published monthly and supplied free to members of Aslib. Annual subscriptions to non-members: £50 (UK)/£60 (overseas); additional subscription to members: £30/£35. Single copy prices and subscription information are available from the Subscriptions Department, Aslib, 3 Belgrave Square, London SW1X 8PL.

Manuscripts and editorial enquires should be addressed to the Editor, *Aslib Proceedings,* Aslib, 3 Belgrave Square, London SW1X 8PL. Manuscripts should be 1,000 to 3,000 words, typewritten, double-spaced, single-sided on A4 paper. Figures should be reproducible. An abstract of up to 200 words should be included. References should follow British Standard 5605:1978. Published authors will receive twenty-five free offprints of their article.

Advertising information is available from the Editor, as above. Further information about Aslib's services and membership rates will be supplied on application to the Director, Aslib, 3 Belgrave Square, London SW1X 8PL. Telephone: 01 235 5050; telex: 23667 (answer-back Aslib London).

© 1984 Aslib and contributors

ISSN 0001 253X

Special libraries and information services and the development of the UK information industry

Harry East

University College, London

Paper presented at the Aslib conference 'Information for National Recovery: Needs—Resources—Technology', University of Stirling, Scotland, 13–16 September 1983.

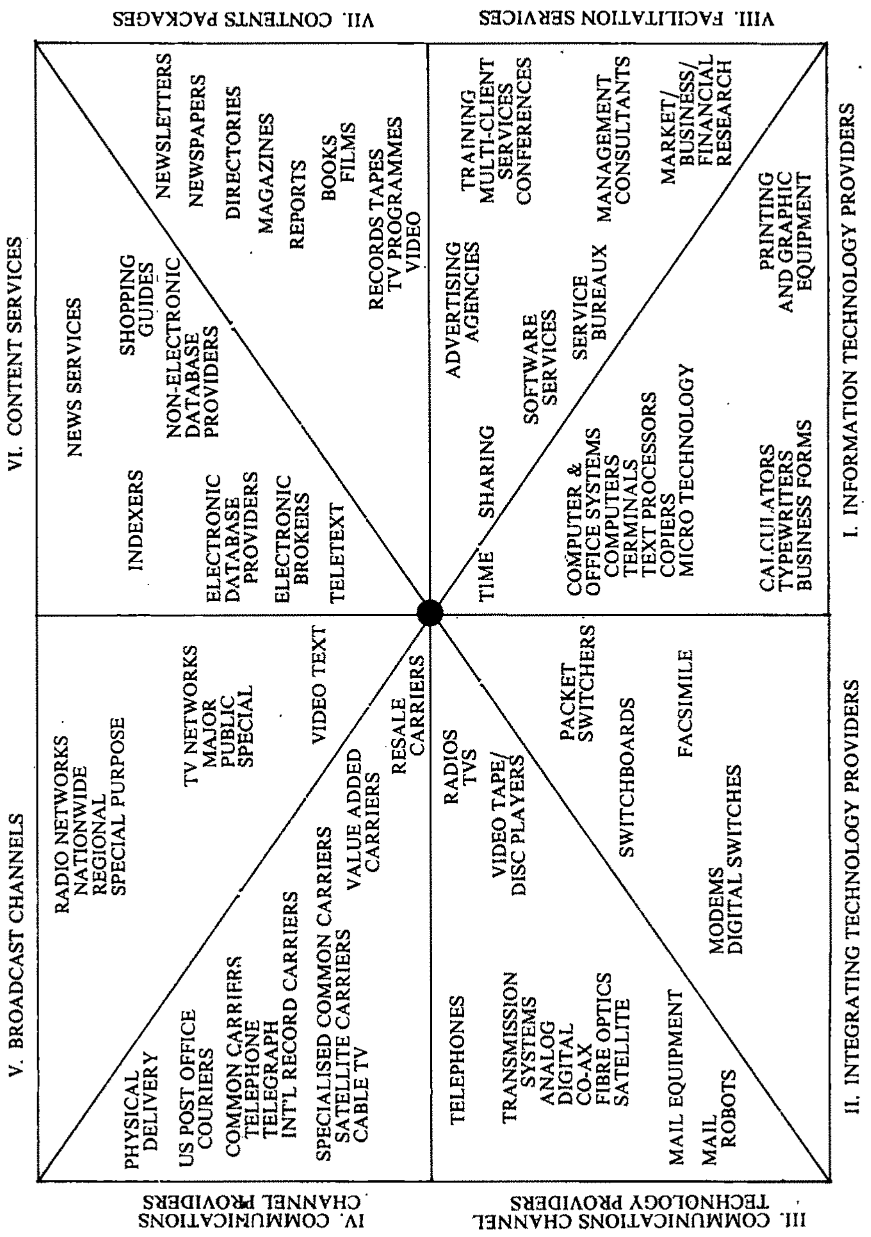
IT WOULD NOT be particularly useful to dwell overlong on defining the information industry. That term, as currently used, can be understood to cover some aspect of most activities in industrialised society. However, it seems to me to be more useful to narrow the focus to those factors that most concern the sort of people who attend Aslib conferences, and the type of special libraries and information units they work in.

If this seems an over-narrow approach, I would argue that a broader one often leads to confusion, irrelevance and excessive introspection. For example, if we look at the 'information universe' as charted in recent studies in Harvard (Figure 1) there are some surprising omissions.[1] For if this universe contains paper-oriented agencies such as libraries, publishers, printers or booksellers they are not bright enough stars to register as such with the observers. Printed materials are clearly there under the guise of 'contents packages'; 'nonelectronic database providers' can be assumed to include some traditional publishers. The paper industry is notably absent, and—as my colleague Brian Vickery has pointed out—'the only place on the chart where libraries may lurk is as "service bureaux" unless they have disappeared down the black hole in the middle'.[2]

A problem with the cosmological approach is that the library and information service component—as it actually exists—appears to pale into insignificance when viewed against the whole. It is possible, even probable, that this component has reached a stage of no growth or even contraction compared with the larger sector. Still it exists, serves, and is likely to continue to do so, in an evolving form maybe, for some time yet. It might also be noted at this point that the concept of an 'information economy' is essentially artificial, developed first by economists to be later embroidered by sociologists. Traditionally a national economy is analysed in three sectors: agriculture, industry and services. In the early sixties Machlup in the United States attempted to identify and measure the output of what he referred to as the 'knowledge industries' as a discrete component of the gross national product. He estimated

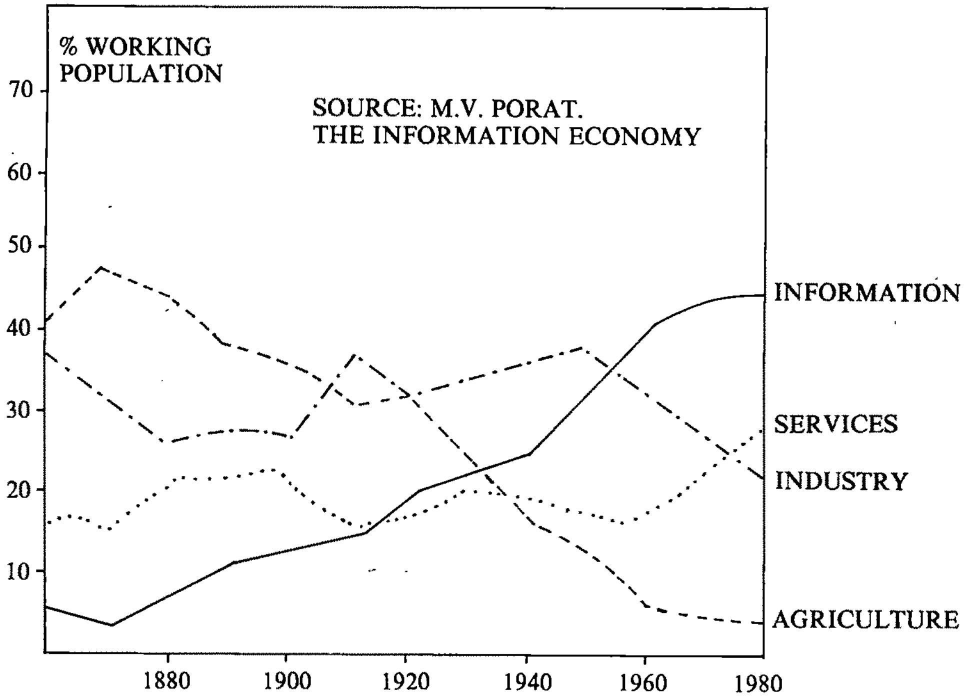
Aslib Proceedings, **36** (2), February 1984, p.61–78. Printed in Great Britain

FIG. 1. The 'Information Universe'.



that it comprised 29 per cent of it. His definition was wide, containing among other things the mass media, computing and office equipment and law. Fifteen years later, Porat attempted more specifically to measure the 'information activity' in the US economy, arriving at a figure of 46 per cent of the GNP He also used a conceptual scheme of classifying information workers as a basis for his analysis. Again this was a broad classification, including for example: scientific and technical personnel, educators and telecommunications workers. Figure 2 gives his four sector aggregation for the US workforce from 1860 to 1980.

FIG. 2.



All this is very interesting, though the approach has not been taken up by many economists partly, I understand, because they do not see any particular merit in separating out information as a separate sector. Some argue that education and leisure activity would be even more appropriately separated out as a fourth sector. What it does indicate is that information, in one form or another, permeates many economic and social activities. The traditional library and information worker is but a small unit in a large and expanding system: one that Daniel Bell has described as a 'new social framework based on telecommunications'.

It is, of course, important to try to understand the implications behind this inexorable change. But I do not think there is much virtue in being hypnotised by it, or in running off in all directions at once in the hope that salvation lies in one of them. Perhaps there are some useful indicators available in our present state and immediate past.

I am going to concentrate from this point on the development of library and information services within industry and commerce and the information sources that they draw upon. Unfortunately, the growth, size and distribution of these services is not well documented. The five-yearly censuses of the Department of Education and Science give us some indications. Figure 3 shows a general decline in special libraries both in the number of units and in the number of staff, particularly in industry and commerce, during the decade 1972–81.[3]

FIG. 3. *UK special libraries and information services. No. of units/No. of staff.*

	No. of units (1981)	*Change in no. of units 1972–81*	*No. of full-time equivalent staff (1981)*	*Change in no. of staff 1972–81*
Govt. dept./station/agency	638	+24%	2458	—6%
Public corporation	105	—1%	555	—22%
Private industry/commerce	880	—26%	2898	—14%
Learned/professional society	132	—30%	637	+6%
Research/trade assoc.	101	—17%	534	+2%
Other	78	—3%	285	+40%
Total	1934	—12%	7367	—5%

FIG. 4. *Size of LIS units (1981).*

	Industry & commerce		Government	
No. of full-time equivalent staff in LIS units	*No. LIS units*	*Cumulative no. of units %*	*No. LIS units*	*Cumulative no. of units %*
Less than 1	185	21	148	23
1	256	50	156	48
2–4	304	85	193	78
5–10	67	92	76	90
11–20	49	98	37	96
21–30	10	99	8	97
31–40	2		3	
41–50	3		3	98
More than 50	5	100	14	100
Total	881	100	638	100

Figure 4 (derived from unpublished 1981 DES census data) illustrates that, in terms of personnel (usually directly related to budget allocation), the majority of these units is small. Fifty per cent are one-man or less-than-one-man bands. In difficult economic times these small and often institutionally isolated units are particularly vulnerable and recent surveys have tended to underline this. Being small, they are also vulnerable to technological change because their chances of securing necessary capital investment are not high.

My own estimate is that industrial and commercial units covered by the 1981 census had budgets totalling approximately £60 million. Typically 50–60 per cent of this is expended on salaries and wages. Library and information work is, of its nature, labour-intensive. There is little data on how information services in the private sector spend their money, but a recent survey by the Technical Change Centre[4] indicates that they are tending to economise first on clerical rather than professional staff, a trend also apparent in government units. This is consistent with increasing use of office technology.

Paradoxically, reduced growth or actual decline of budgets, tends—over the short term at any rate—to increase the proportion of the total budget expended on labour. Figure 5 has been compiled from published data relating to expenditure of public and university libraries over the last decade on acquisitions and salaries (expressed as percentages of total expenditure).[5] Whatever the complex causes, the effects are clear: proportionally more is being spent on direct labour, proportionally less on new stock. These are dangerous trends. If the percentage rise in labour costs indicated a growth of essentially labour intensive *information services*, we might take comfort in the increase in value added to these services. But in my view this would be an unduly optimistic assumption. Unfortunately, public and university libraries do not have well established mechanisms for bucking these trends. The Lending Division of the British Library to some extent has, as can be observed from Figure 6. The trends in salary and acquisition expenditure are similar to those observed in other libraries, but the possibility of increasing earned income is available and has been exploited.[6]

There are no available and comparable figures for special libraries and information services. Although there are similar (often greater) economic pressures; I suspect that, in general, increasing labour costs have not been allowed to absorb other objectives of expenditure: most assuredly they will not be allowed to do so in the future. Private sector services are, moreover, more sensitive to demand and to general pressures towards capital, rather than labour, intensivity.

Despite the large increase in computer applications and a small but highly significant increase in electronic publication, information services of all types continue to spend the bulk of their available income on printed products. While abstracting and indexing services take a relatively small proportion of this income, they are important precursors of change in the information industry.

Figure 7 shows the growth in the number of publicly available UK based abstracting and indexing services in science and technology during this century. (A logarithmic plot of this data, as we might expect, indicates

FIG. 5. *Public and university library expenditures.*

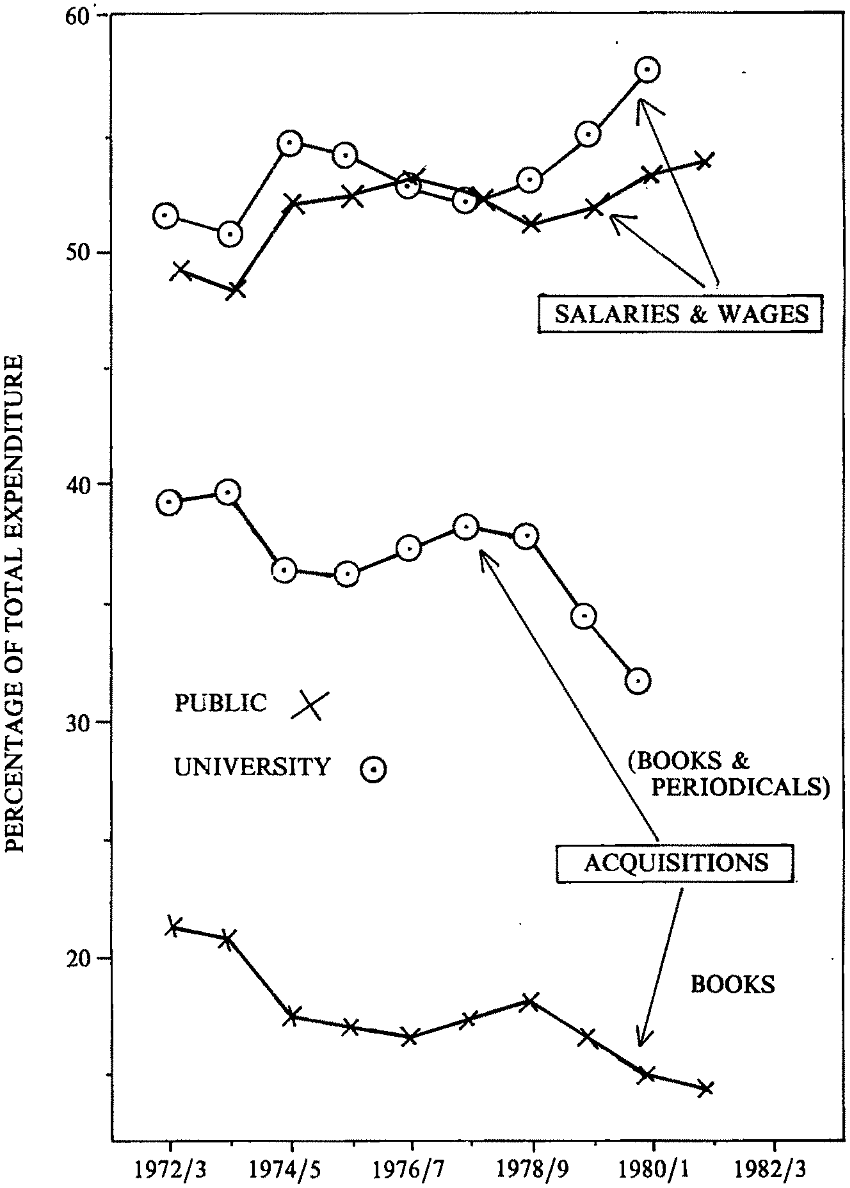


FIG. 6. *British Library Lending Division expenditures.*

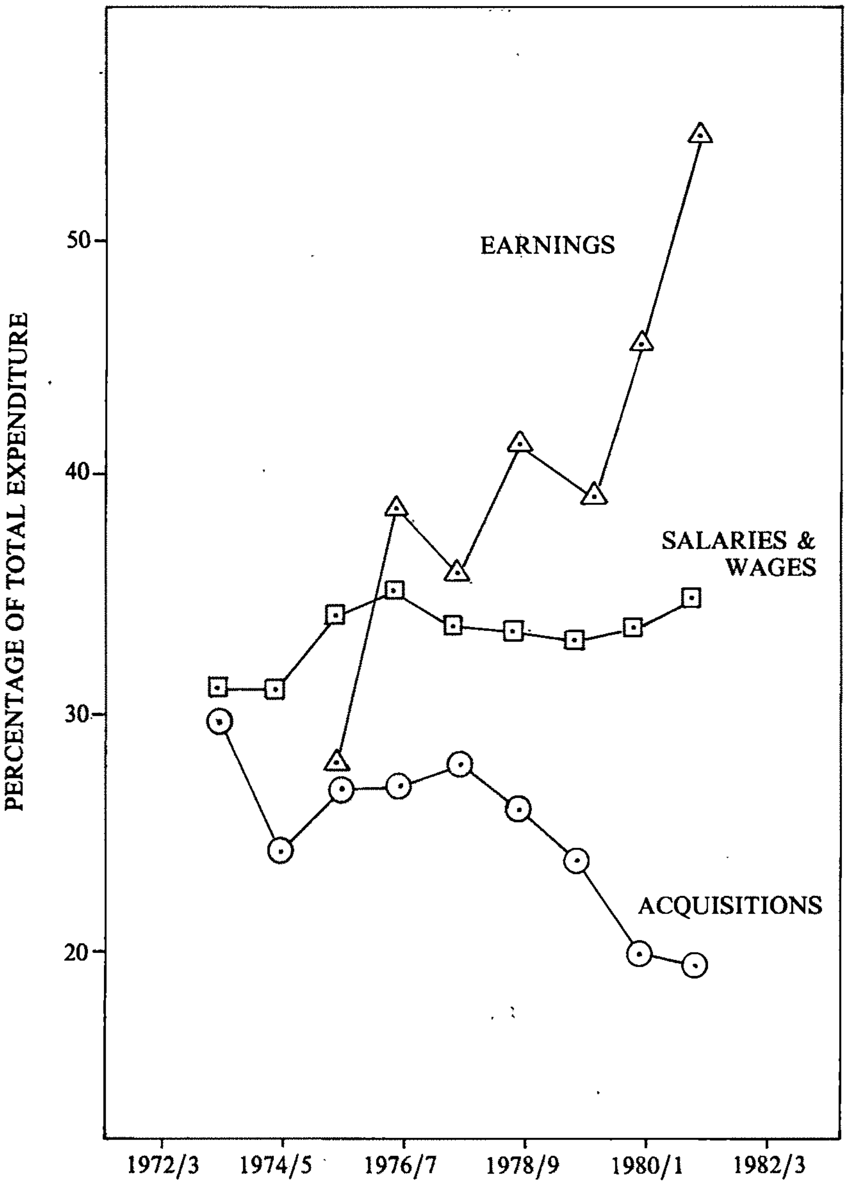
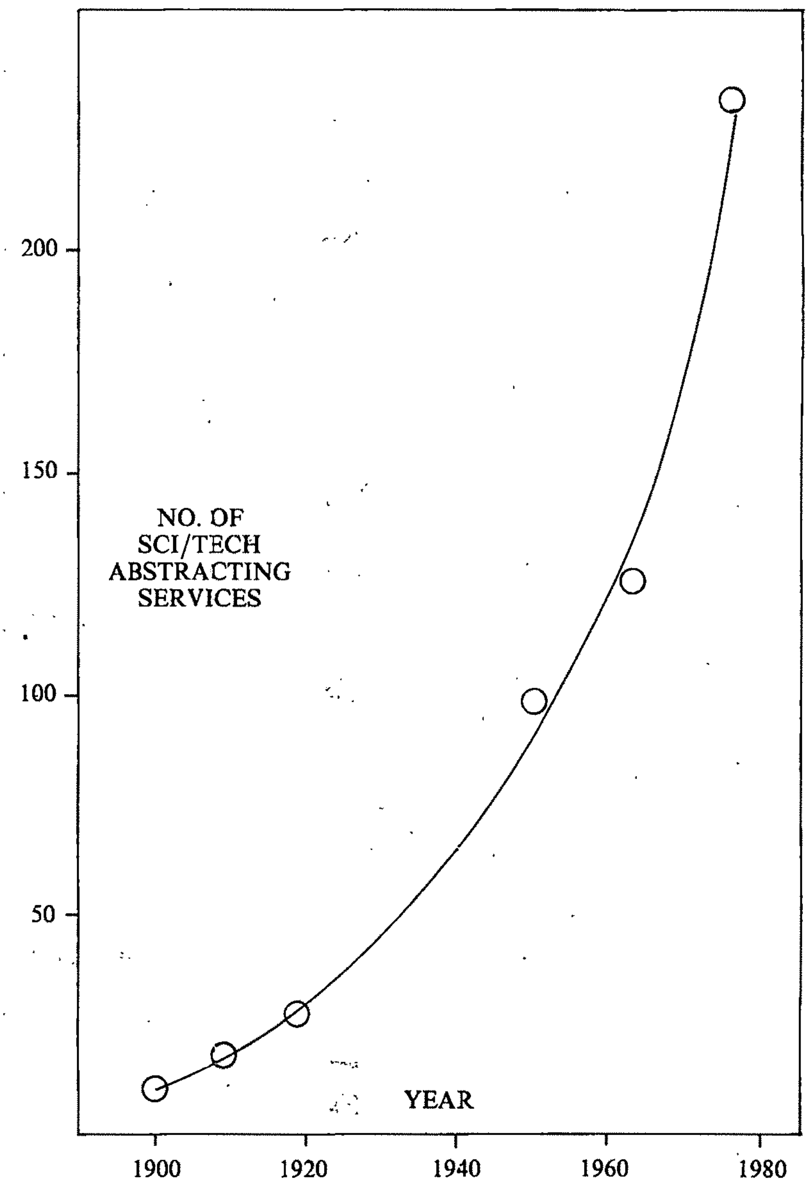


FIG. 7. *Growth of UK abstracting services.*



exponential growth.) Initially, virtually all of these services were produced by learned and professional societies. In other words the services were controlled, and directly or indirectly paid for, by their users. There was also a preponderance of science over technology.[7] Between the First and Second World Wars government and government-with-industry accounted for much of the growth of new services. It was in this period, for example, that the Imperial (latterly Commonwealth) Agricultural Bureaux laid down their services and the research associations became active. So the position by 1950 (Figure 8) was that the 'market' was divided between learned and professional societies, who held about half, and government and the trade and research associations, who controlled about a quarter each. (Note that the numbers in Figure 8 refer to percentages of abstracts published annually.) Strictly commercial production of abstracts was almost negligible. As in most primitive economies, there was a considerable overlap between producing and consuming groups, with a relatively small and unsophisticated marketing sector and few perceptible profits. Indeed, considerable numbers of both primary and secondary journals were acquired outside the cash nexus, by 'exchange'—a posh word for barter—a now obsolescent practice.

FIG. 8. *UK production of published abstracts (sci/tech).*

	% Total Abstracts Published	
Publisher type	*1950*	*1977*
Learned/professional societies and academic	46.2	20.0
Government	27.0	9.0
Research/trade associations	25.4	8.0
Commercial	1.4	53.0

But in the ensuing thirty years the picture had changed radically and irrevocably. More than half the abstracts published were now produced by commercial organisations, not all of them large. The reasons for this development are undoubtedly complex but some are fairly obvious. Entrepreneurs saw that the growth of new technological missions and cross-disciplinary sciences offered unfilled and possibly profitable gaps in information service provision. Moreover, the inherent inertia of existing institutions virtually assured that there would be no, or at most tardy, competition.

Two of the most successful UK companies—Derwent and Information Retrieval Ltd—exemplified the pattern, in the patent and new bioscience fields respectively. It might be noted that these services were developed by the initiative of individuals rather than institutions. It should be also pointed out, and underlined, that for specialised services at least, the message remains more important than the medium. Neither of these two companies were prominently early in marketing their services online. This is not to underestimate the contemporary importance of onlinearity of databases, but to emphasise that the marketing mix has to be appropriate. New and flashy services can come to grief if the content does not reflect the need of a suitably sized group of consumers.

Growth in the commercial services has not been necessarily at the expense of the learned societies, research associations and others. But in general the latter longer-established institutions, having staked an early claim on a piece of information territory, tended to keep within their boundaries or venture beyond them rather tentatively. Co-operative marketing between professional societies and commercial organisations is not a new practice but it is a growing one. Professional societies alone, given a good product and judicious marketing, can make respectable incomes—IEE/INSPEC being a notable example. Indeed, the American 'for profit' and 'not-for-profit' classification of institutions carries with it decreasing implications about profitability. The theme of a recent conference in Luxembourg sponsored by the European information industry was 'How to make money out of information'—a title with all the finesse of a pair of Dr Marten's boots, but consonant with the spirit of the times. No doubt the not-for-profiteers were adequately represented.

The smaller, more focussed, services of the research associations have generally survived to enter the online era. That a number of them have agreed to a sole marketing arrangement with one large commercial publisher indicates the pursuit of at least cost recovery, if not profits. (More recently, the Commonwealth Agricultural Bureaux has succumbed to similar overtures.) Despite this, it is worth remembering that the information service industry in this country, as elsewhere in the western world, has evolved as a mixed economy, with significant, if changing, patterns of state intervention. The research associations themselves were created by co-operation between government and industry with a traditional emphasis on the dissemination of information.

The growth of the commercial sector has tended to provoke a number of important issues. For example, there has been much posthaste and rummage in the trade press about monopolistic practices and restrictive agreements. The information industry lobby, more powerful in the United States than elsewhere, successfully campaigned to get the (federally-funded) National Library of Medicine to release its databases to commercial vendors. It has also applied pressure to get the NLM to raise its online charges to levels comparable with those of other cost-recovery services. But the NLM has always sold its printed services well below cost recovery to its alleged economically naive consumers. Similarly, the right of the Chemical Abstracts Service to market its *printed* services monopolistically or by limited franchise has not been in question, but this has somehow become unfair if the medium is electronic. Monopolies are always wicked in the hands of others.

Such pressures are symptomatic of an instability brought about by the possibility of rapid technological change in a time of economic uncertainty. I think that it is safe to say that we can envisage the general directions in which the information industry is developing, but the rate of development is not easily predictable, certainly not by extrapolation from a very different past.

Quantitative data about the growth of the information industry in the UK is scarce. Figures from the US[8] indicate trends which are probably paralleled in Europe although one would suspect that, for example, the rate of switching from conventional to electronic delivery would be lower. Figure 9 illustrates the continuing dominance of ink-on-paper delivery, but the larger growth, in terms of revenues, of electronic delivery. (The data relates to a rather broad definition of the US information industry, as Figure 10 indicates.)

FIG. 9. *US information revenues by mode of delivery.*

Mode of delivery	*1979 total % revenue*	*% change in revenues 1978–9*
Computer online	11.7	36
Machine readable (not online)	3.8	22
Non-machine readable (total)	84.5	17
• Inkprint	70.1	15
• Microform	6.3	18
• Personal contact	6.5	41
• Other forms	1.6	21

FIG. 10. *US information revenues by subjects/types.*

	% total revenue (1979)	*% change in revenue (1978–79)*
Credit/economic/finance	39.7	13
Legal/regulatory	2.9	28
Product/marketing/media	41.7	16
Medical/scientific/technical	6.8	47
All other types of information	8.9	26
Total	100.0	17

FIG. 11.

UK abstracting services (March 1983).

Number of online databases	52	8 with no printed version 44 from 102 printed journals
Abstracts journals not online		
More than 2000 entries per year	48	
Less than 2000 entries per year	108	

Figure 11 gives an interesting commentary on online developments with UK databases.[9] First it should be noted that print remains the dominant alternative: some 260 abstracts journals are still available in this medium. However, the content of 40 per cent of these journals is also available online, and these represent the larger and more significant services. Only a small proportion of those not already online would be economically viable in an international network. Moreover there is a small but growing number of databases (all new) which are *not* published in the printed form.

Nevertheless parallel publishing remains the norm, with the bulk of revenues coming from print. Recently published figures from *Excerpta Medica* may or may not be typical for large services: online sales account for 12.5 per cent of their total database revenue; growth in online sales has been 40 per cent per annum; the decline in the number of units of hard copy products sold has been 5 per cent a year.[10] Speculation about migration from print has drawn the following observations from a working party recently set up by the Office of Arts and Libraries to consider the impact of electronic publishing on the UK:

> Any realistic reading of the economic prospects leads to the conclusion that fully electronic publishing will make slower progress than was envisaged a few years ago; that it will affect some types of publications more than others; and that its progress will depend on its capabilities becoming better exploited and on the growth of a market population familiar with the use of computers and having access to microcomputer terminals.[11]

Despite the attention focussed on online bibliographic and text retrieval by the profession, actual expenditure on this form of access is relatively low. A fairly generous estimate for the total UK expenditure on publicly available online networks in 1982 is approximately £3 million. This is about 2 per cent of the estimated total expenditure on libraries and information services, and about comparable with the amount consumed by interlibrary lending activities. Such information as we have (Figure 12) suggests that two-thirds of online searching is being undertaken by special libraries and information services, and almost half is attributable to industry and commerce.[12]

FIG. 12.

Share of online activity (1982).

Industry, government, other special	71%
Academic	21%
Local govt. (inc public libraries)	8%

Percentage of requests received by BLLD resulting from online searches

Industry, govt., other special	16%
Academic	6%
Local govt. (inc. public libraries)	2%

FIG. 13. *Cash flows and online services.*

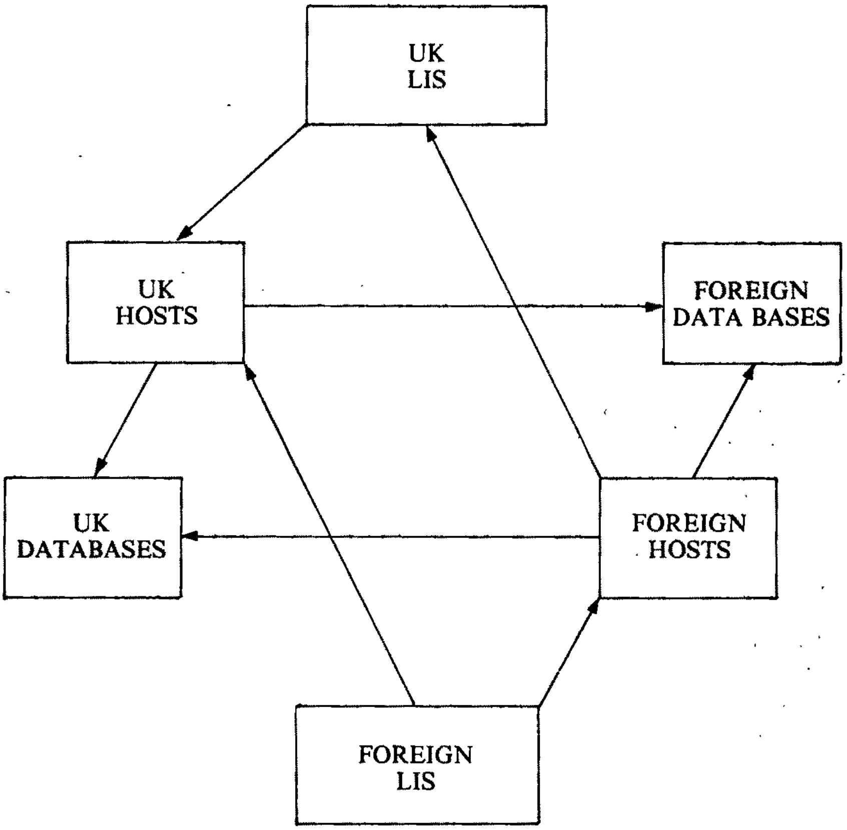


Figure 13 shows, in a highly simplified manner, the principal cash flows relating to the purchase of online services within and beyond the UK. The main components are (a) connect charges (going to hosts) (b) royalties (going to database producers) (c) telecommunication and network charges. The major flow *from* the UK library and information system is to foreign hosts (70 per cent or more of the traffic), mostly to US hosts. But the best estimates show that the inflow of royalties (to local database producers) maintains a rough balance of trade, for the time being at any rate.

As users are, on the whole, indifferent to balance of trade considerations, this has been an area of intervention at national and regional levels. It is well known that the European Communities, acting through the Commission, has fostered the development of networks, hosts, and more latterly databases in its region—to my mind a wholly appropriate response to the majority share held by the US information industry. The UK national effort in this area has, I feel, been somewhat patchy in the past largely because of a lack of co-ordination, perhaps even of collective understanding, between the appropriate ministries, and the non-, or at most slow, emergence of a coherent voice on the part of the information community as a whole. Hardware has received a great deal more attention than software and services, yet in the latter the UK has considerable potential consisting of reserves of well-educated people in a relatively low-wage economy. They all work in the international language of communication too. (It might be noted here that the British Library and its predecessor OSTI have a fairly respectable track record in supporting with modest resources the development of online services and databases.) More recently the government has announced the availability of a £5 million scheme for grants covering up to one-third of the costs of developing databases providing information to business and industry.

Within this changing economic and technological scene, what are the implications for the information unit and the information specialist? Here we are considering those agents acting as 'intermediaries'. (The profession has, incidentally, a near genius for inventing or adopting unexciting and colourless terminology of which 'intermediary' is one and 'grey literature' is but one of several others.) Generally, intermediaries are, at best, a necessary evil. Information providers prefer to maximise their sales by reaching directly as many end users as possible. Users will only tend to go through an intermediary when the direct approach is more painful or manifestly unreliable.

The traditional 'warehousing' function of libraries only remains justified by the economics of control of large volumes of information in the ink-on-paper medium. Centralisation of physical resources, properly handled, is usually a cost-effective approach. Forty years ago it was reasonable for every physicist to have a personal copy of *Physics Abstracts*. As the volume and cost increased, the purchase and storage of this publication became almost an entirely library function. From the point of view of the supplier this was an acceptable adjustment: the demand from libraries was, until recently, remarkably inelastic with respect to price. If, as is often the case with secondary publications, there was a virtual monopoly, the publisher could expect a reasonably assured income.

Monopolistic databases in the long-established areas of science and technology generally arose because producing databases is a labour intensive activity with limited prospects for much profit. The majority of large established databases in science and technology are produced by non-commercial organisations and generally the market will support just one such specialised service.

Marketing the same information electronically changes the picture radically. Instead of selling bulk-packaged information (printed journals) for advanced subscriptions, the vendor is offering smaller specialised bits of information, cash on delivery. The information delivered is highly specific to intermittent demands of individual users. Online services are also capital intensive, requiring a high investment in hardware and software. It is in the interest of the vendors to sell directly to the specialist end user, who originates the demand and can be stimulated to further use.

In a sense, intermediaries get in the way of such demand, though for the best of possible motives. In current practice, the library and information community dominate mediation of online bibliographic searching as the 1982 survey of users by the Online Centre, and other surveys, have shown (refs. 12a and 13). It can be argued that the high current level of mediation is transitory. Centralised information units were easy to activate by the new online vendors, could readily appreciate the advantages of the new techniques, and by-and-large were motivated to acquire the appropriate equipment and training. They have gained prestige with their users for doing so. And while the protocols continue to evolve and the systems themselves are not particularly 'user friendly' (another inelegant term), end users have little motivation to become involved. But systems will become more transparent because it is in the interests of the end user, and therefore the supplier, that they should be so.

I shall now attempt to draw some tentative conclusions. You may have noticed that I have avoided arguing from the technology-push viewpoint, however persuasive that might be. This is because technological projections can take you in any direction your fancy chooses—to the Millennium or Doomsday—depending on your predilections and who you are trying to impress. I will say, however, in passing, that the scenario of the 'global village' where everyone seems to make a living by taking in each other's electronic washing, needs a good deal more development before it persuades me. Some of the social implications are—to me—horrifying, though I accept that this does not make them less possible in the long term.

In the short term there are plenty of problems and challenges.

— We are in a profession still dominated by paper communication and work with systems and budgetary approaches geared towards physical stock and its control. There are clear signs that the document acquisition side of our activities is on the economic decline, and there is little that can be done to stop it even if this were desirable.

- — Electronic delivery, which is on the increase, requires a whole new approach to management and financing, and tends to bypass intermediaries as delivery systems become more sophisticated, i.e. easier to approach directly by the end user.

Some elements of this dichotomy are revealed in Figure 14, where I have contrasted information brokerage (tending to be highly oriented to electronic delivery) with traditional library (document oriented) services. I am sceptical about some libraries, particularly those in higher education, being able to cope with electronic publishing. If you read the annual reports of university librarians you will find that, faced with intractable problems of budget cuts, they become even more preoccupied with the maintenance of the status quo of collections and the staff to service them. Similarly, the modest proposals of LISC report advocating some movement from a 'holdings' strategy to an 'access' strategy was described in the Library Association Record (March 1982) as a 'cataclysmic change'. Some cataclysm, some change.

- — Where there is an apparent choice in investing in a machine-based personal system or supporting a labour-intensive general service, the former is almost inevitably chosen. People prefer their own cars to public transport systems and, curiously and perhaps more analogously relevant, even to taxis.
- — Information is not getting cheaper but is growing in volume and demand. As costs increase they are unlikely to be subsumed under 'overheads', so services will increasingly have to derive their funding from payment on use.

The consumer is much more conscious of a choice if payment is visible: the range of choices goes from do-it-yourself to high value-added services. There is much scope for development in the information do-it-yourself area and presumably high value-added services will have to be just that in order to compete.

FIG. 14.

	Admin. expenses	*Marketing expenses*	*Material acquisition & storage costs*	*Computer/ telecom. costs*	*Subject specialisation*
Library orientation	higher	lower	higher	lower	lower
Information brokerage orientation	lower	higher	lower	higher	higher

On the other hand there are some interesting opportunities in the interim between now and the advent of all-knowing expert systems, which will not only displace information scientists but also doctors, lawyers and possibly priests.

- Electronic delivery gives the entrepreneur the possibility, with small investment, to produce highly specialised—personalised even—services.
- Information brokerage, either within an institution or as an outside agency, is likely to become a skill in demand because the market and resources are becoming much more complex and increasing competition is likely to exacerbate the complexity.

All this seems highly relevant to Aslib's past, present and future (and here I refer to Aslib as a body catholic, rather than a headquarters group in London SW1). The first thing that Aslib achieved was the creation of its Directory. Sir Ernest Rutherford, in introducing the first edition wrote: 'while the expert may be assumed to be cognizant of sources of importance in his own field, it is clearly desirable if not essential that there should be a general key indicating where one should turn for information in any sphere of knowledge.' In a remarkably modern phrase, Rutherford described Aslib as 'essentially a clearinghouse for specialized information'.

As I read the early history, there was some suggestion that, having produced the first Directory, the temporary association could then be disestablished, having no further useful function to perform. Wiser councils prevailed because the founding members of Aslib had identified a crucial need: that of switching users to information wherever it was located and whatever its form. It seems to me that the recent restatement of Aslib's objectives as 'information management' is a shrewd, timely and wholly justified reassertion of that role.

Information is a costly and valuable resource and it needs management. More extensive electronic delivery, more competition, more choice present very real problems. Every organisation of any size has a purchasing officer who is versed in sources of materials and equipment, costs, values, delivery times, contractual obligations, snags and shortcuts. Information is, according to Bell, the new capital, replacing raw muscle power, or energy. What more challenging and necessary role could there be at the turn of the century than an increasing commitment to the management of it?

ACKNOWLEDGEMENTS

Some of the data presented in this paper has been collected and reassembled in the course of a research project, funded by the British Library Research and Development Department, in which the structure and resources of the UK library and information network are being examined. I am also particularly indebted to Mr T. Knight, of the Department of Education and Science, for supplying data that was used to compile Figure 4, and to Miss A. Vickery and J. Stephens of the Central Information Services, University of London, for making available the database from which Figure 11 was compiled. The staff of the Aslib Library have been an unfailing source of help, advice and information.

REFERENCES

1. From the Information Handling Services, Harvard University. Quoted in: ARMSTRONG, A. A. The Jonan syndrome. Will buying and selling change the industry? *Bull ASIS*, 7 (2), 20–3.
2. VICKERY, B. C., HESTLETINE, R. G. *and* BROWN, C. B. Information system dynamics: The impact of interactive information networks on the UK library and information system. Report to British Library Research and Development Department. December 1982: University College London, School of Library, Archive and Information Studies.
3. Data derived from the Census of staff in librarianship and information work in the United Kingdom (1972, 1976, 1981). Department of Education and Science.
4. JONES, A. D. W. *et al.* Information demand and supply in British Industry. 1077–1983. Report to the British Library Research and Development Department. April 1983: The Technical Change Centre.
5. Data derived from:
    (a) Public library statistics (annual). Chartered Institute of Public Finance and Accounting (CIPFA).
    (b) Statistics of education (Vol. 6) and University statistics (Vol. 3: Finance). University Grants Committee.
6. Data derived from British Library Annual Reports.
7. Data derived from numerous sources, including:
    (a) MANZER, B. M. *The abstract journal, 1790–1920.* 1977: The Scarecrow Press.
    (b) THE ROYAL SOCIETY. *A list of periodicals and bulletins containing abstracts published in Great Britain.* 1950: Cambridge University Press.
    (c) DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH. *Technological abstracts originating in the British Commonwealth.* 1963: DSIR.
    (d) EAST, H. *Some statistical indicators of UK abstracting and indexing services.* British Library Research and Development Report, No. 5488. July 1979.
8. NIELSON, P. R. Highlights of the business of information report 1980: a survey of the Information Industry Association. In: The electronic information marketplace. Size, trends and problems. Proceedings of a symposium held in Luxembourg, January 1981. 1981: EURIPA.
9. Data derived from information collected for the: Inventory of abstracting and indexing services in the UK Central Information Services, London University. *British Library LIR Report*, No. 21. 1983: Available from the Publications section of BLLD (ISBN 0 7123 3030 5).
10. JANSEN, A. J. Effects of online use on total database exploitation. 6th International Online Meeting, 231–42. 1982: Learned Information.
11. The impact of electronic publishing. A discussion document prepared by a working group set up by the Office of Arts and Libraries. 1983: Department of Education and Science.
12. (a) DEUNETTE, J. *and* HALL, S. *1982 survey of UK online users. A report on current online usage.* 1983: Aslib, Online Information Centre. (b) RUSSON, D. *and* TAYLOR, P. Sources of references for interlibrary loan requests. *Interlending and Document Supply*, **11** (2), 58–60.
13. COLLIER, H. R. European online users, a mid 1981 report. *Online Review*, **6** (1), February 1982, 27–35.

The intermediary today and tomorrow

Pauline Duckitt

Paper presented at the Aslib conference 'Information for National Recovery: Needs—Resources—Technology', University of Stirling, Scotland, 13–16 September 1983.

Prologue

MODERN FABLES DO NOT begin 'Once upon a time'. 'Imagine in the future' is more appropriate. If you are familiar with Douglas Adams' *Hitchhiker's Guide to the Galaxy* you may know this fable already. Imagine in the future a planet in another solar system. The planet is called Golgafrincham, although that hardly matters. The people of Golgafrincham are unhappy; something must be done. The rulers confer and produce a solution to their plight. Rumours are spread amongst the population that their planet is doomed—it is going to crash into the sun, it will be invaded by a swarm of giant piranha bees, it is going to be eaten by a mutant star goat! In order to save themselves, the whole population must be removed to another planet using giant space arks. Into the first 'A' ark will go all the brilliant leaders, the scientists, the great artists—all the achievers. Into the third or 'C' ark will go all the people who do the necessary work and make things. And into the 'B' ark will go everyone else—the middlemen: hairdressers, TV producers, insurance salesmen, personnel officers, public relations executives, management consultants, telephone sanitizers and information intermediaries. The catch, as you will probably have guessed, is that the 'B' ark is despatched first, just to make sure that the 'A' and 'C' people, when they arrive in their new home, can be sure of a good haircut and clean telephones. Only they never do arrive. They never leave. But they have got rid of all their middlemen and happiness is restored.

The moral of this tale and of the ensuing paper is that middlemen, including intermediaries, are never appreciated by the people they serve and are always the first to go when things get tough. Only those who excel at being middlemen and who can be flexible in what they do will survive.

The intermediary today

'Intermediary' is, of course, the non-sexist term for 'middleman'. You may prefer the term 'intermediary' for other reasons. 'Middleman' has definite pejorative connotations. These probably arise from two deep-seated opinions: firstly, that middlemen are in that position because they are neither creative nor productive; secondly, that middlemen are parasites on producers and consumers because they make a living 'merely' by bringing them together.

Aslib Proceedings, **36** (2), February 1984, p.79–86. Printed in Great Britain

If we want to take a less cynical view, we can recognise that the value of intermediaries actually lies in this characteristic. They satisfy the requirements of both producer and consumer through their specific knowledge of the products available and of both populations. They also have the ability to transfer these products or services between producer and consumer.

This is how we as information intermediaries like to think of ourselves. Christine Baker, in her investigations of the role and importance of intermediaries, has listed their desirable characteristics.[1] Although she is specifically considering online intermediaries, the characteristics, with a little modification, apply to information intermediaries of all types. In bringing together the producers of information and the information users or consumers, the intermediary must have a knowledge of the sources of information and how information may be extracted from them. This will include the technical aspects of information transfer and a knowledge of the subject under consideration. The intermediary must be aware not only of the users' characteristics but also of the environments in which they operate. To effect the transfer, the intermediary must have certain skills and certain personality traits. The skills involve communication, interpretation, mental dexterity and, with any work involving keyboards, manual dexterity as well. In personality, the intermediary must be intuitive, extraverted and interested in other people, empathic, enquiring, self-confident and flexible.

These areas of knowledge and skills and this sort of personality are important, if not essential, for the information intermediary today. Lest you be thinking that this does not apply to you, it is an appropriate place to point out that my use of the term 'intermediary' as a middleman in the information world encompasses not only search intermediaries but also information officers with broader duties, reference librarians and information managers. Whether you are an intermediary yourself or whether you employ them, you may be aware of certain tensions in this sort of job at present. It is difficult to generalise as the variety of working conditions of intermediaries is so great that many are already in the world of tomorrow while some have not even arrived at today. If we take the middle ground, the following causes of tension may apply:

- — mismatch in some cases between the type of person who enters an information job and the type of person who is suited to the job;
- — gaps in the skills and knowledge possessed by intermediaries;
- — difficulties in justifying the intermediary's job to management.

The first of these, mismatch in personality types, has probably always been with us. Not everybody is extraverted, enquiring and self-confident—we would never have a quiet moment if they were! But the time is past when intermediaries who would rather sit at their desks than go out and face the users can be supported by their organisations. They must be effective at what they are supposed to be doing. Effectiveness is also becoming more dependent on technical know-how, whether it be knowledge of a keyboard allowing quicker online searching or the ability to specify a microcomputer system. As to the last of these tensions, we have only to consider the findings of the

Technical Change Centre on the effects of the recession on information units in British industry to realise its implications for us. One third of the 139 information units surveyed had been threatened with severe cutbacks or closures. Those whose staff had not resisted the threats in any way, e.g. by presenting evidence in support of the value of their work, had been axed, whereas those whose staff had fought the initial decision had achieved some compromise.

The intermediary in transition

Tensions arise when conditions are changing. The relatively minor tremors we are seeing today are, in my view, indicative of greater earthquakes to come. I want to identify and discuss two factors which are in operation now and will be instrumental in changing circumstances for the intermediary of tomorrow. In doing this, I want to make use of the broad spectrum of conditions in the information scene to which I have already referred, and anchor the prospect of the future firmly in what is happening today. I want to investigate the far end of the spectrum of today's activities and from these deduce the conditions of tomorrow, rather than have mere flights of fancy.

The two factors operating to change the conditions of the intermediary are:

- the penetration of 'information' into a much larger number of jobs than at present;
- the erosion of the barrier between information producer and information consumer.

They can be seen as following from the post-industrial society and economy that Stonier has described.[2] From our point of view, the most important features of the post-industrial scene are:

- a service economy rather than a manufacturing one, with the knowledge industry predominating;
- a labour force no longer dominated by people who work with machines (machine operatives) but by information operatives.

Stonier offers an extreme 'informacentric' view of post-industrial society where almost any job can be seen as an information job, for example:

- organisation of information: managers
- transmission of information: secretaries, telephone operators, postal workers, journalists and others in mass media, educators, technical salespeople, information technologists
- information storage and retrieval: filing clerks, librarians, computer programmers
- creation of new information or new patterns of information: scientists, artists, statisticians, architects, designers
- application of information to solve particular problems: lawyers, doctors, counsellors, accountants
- reception of information: students

I would add to these categories:

— production and packaging of information: publishers
— manipulation of information: advertising and public relations executives

This view is not as far off course as it may look at first glance. Today, you have only to examine advertisements for jobs with explicit 'information' content to realise that they cover a wider range of types of job in a wider range of types of organisation than have ever been associated with the traditional information intermediary. Nor would an average person with information science qualifications necessarily have the right skills or characteristics for them. Let me give you some examples of these jobs, all taken from daily newspapers in the last six months.

1. *Leading management positions in Prestel Indexing Group.* Prestel, the world viewdata service, needs to appoint a Manager and Assistant Manager with responsibility for the indexing of its extensive database to meet growing user needs. The successful candidates will contribute ideas for improving the structure and presentation of the 250,000 pages of information on Prestel. Responsibilities will involve liaison with Information Providers, helping to develop new Prestel products, conducting research into user needs and assisting in the specification of microcomputer based systems for handling Prestel information. Candidates will have some microcomputer experience; ideally, first-hand knowledge of the videotex business; and ability to develop the visual capabilities of the Prestel system.

2. *Information Officer, The Independent Broadcasting Authority.* We need another Information Officer to join and help the present team in a period of expansion and new development. The new member of the team will gather material and ideas for fact-sheets and briefs; provide drafts for news and features from source material and briefs for other public statements; help to handle inquiries from the media, from organisations and from the public; and assist in the arranging of events. A high level of writing skill will be particularly important, along with thoroughness and accuracy in researching facts and views, and sensitivity to communication needs. Experience and knowledge of the nature of information and public relations work will be essential, and a general understanding of broadcasting affairs valuable.

3. *Information Officer, Greater London Enterprise Board.* We are looking for someone to tell London (and the world!) what we are doing and why. You will have a lively and imaginative turn of mind, educated to degree-equivalent level, and have at least five years' experience as a working journalist, ideally writing about some aspects of industry. You should be willing to turn your hand to a wide range of tasks from preparing fast accurate copy, to supervising the production of pamphlets, brochures and other publicity material and spreading the word through a variety of media (not least word of mouth).

4. *Information Assistant at Saatchi & Saatchi.* We are looking for a recent college leaver who is intent on making a career in business information. A

relevant qualification or related experience which demonstrates a serious interest in this field would be an asset.

5. *Directory Development Manager, Waterlow Publishers Ltd.* An ambitious person with good experience of databased electronic publishing and/or directory publishing. Your understanding of information collection from design, typography, scheduling and printing, as well as the economics and technicalities of directory production, will help you with the task of developing and expanding our present range of publications into new specialised markets.

The most interesting and telling features of these advertisements are:

— the role of mass communications media (television, viewdata, advertising);

— the importance of technology (viewdata, microcomputers, electronic publishing);

— the emphasis on communications skills, whether written, verbal or visual;

— the mention of information science qualifications in only one of these advertisements.

We have here our first paradox. While the post-industrial society will be characterised by information operatives of all types and levels, not all jobs will necessarily involve the kind of work or require the kind of skills that information intermediaries now have.

Moving on to the second factor operating on the fate of the intermediary, we must examine the erosion of the barrier between information producer and information consumer. Clear signs of this happening are now visible. It has obvious implications for the livelihood of intermediaries as their existence depends on there being a barrier which their skills and knowledge alone can overcome.

When the volume of published information was small, people generally sought their own information, relying on their knowledge of their own field and personal contacts. The vast increase in the amount of information and the need for information from many different fields of knowledge to support one person's work opened up the opportunity for custodians of information and some interested scientists to specialise in knowledge and use of information sources and so become intermediaries. Now, computers have made the information manageable again. Ease of access to microcomputers, either as terminals to remote computers for database access or for manipulating subsets of databases locally, means that it is reasonable for end users or enquirers to make their own searches. Several large companies in the UK now have research staff undertaking their own online searches with satisfactory results. Online host systems promote their services directly to end users.

The growth in the number of home computers, both for business and personal use, can only consolidate the trend away from the need for an intermediary. BRS and Dialog both have services specifically aimed at the home market. Almost two-thirds of top UK companies believe they will employ executives working from home by 1988. Already more than 20 per cent of UK companies with an annual turnover of more than £500 million have executives working from home using personal computers.

I am well aware of the arguments for the continuing value of the intermediary in the face of ease of access to information by the end user. The primary argument is that present systems are not user-friendly and need an intermediary to interpret them. Christine Baker has argued this case excellently.[3] Her conclusion is that until information retrieval systems do become user-friendly, then the jobs of online search intermediaries are secure. I would agree that this is true in the academic library setting with the kinds of bibliographic reference systems that started off the online boom.

However, these have been overtaken by developments in the business world where an amount of money the size of Dialog's annual turnover is almost irrelevant. In currency dealing, for example, success or failure can be measured in seconds, with thousands or millions of pounds worth of business depending on the dealer obtaining instant telephone connections to his trading partners and having immediate access to the latest money market information. That is why a bank like Chase Manhattan can afford to install the most up to date equipment for its dealers, integrating telephony with computer access and data retrieval. Reading about their dealer stations with a single screen and keyboard where the dealer can make telephone calls simply by touching a display and can get information from internal and external databases shown on the same screen, makes the average intermediary want to give up the struggle with British Telecom just to get a local PSS node. Even though enormous amounts of money are required, the technology does exist to make information retrieval systems transparent to the user.

In the light of such developments, it seems that intermediaries are in danger of becoming second-class citizens. The market that they represent is simply not big enough to interest the people who can really make the technology work. To the end user it makes sense and is good business practice to buy as close to the source as possible to avoid middlemen. Then there is the trend to add value to data to make it information and to information to make it knowledge. This militates against intermediaries who, although they may possess valuable background knowledge, are not the people who will produce the all-important knowledge for the post-industrial society.

So we reach our second paradox. As technology gives unparalleled opportunities for information retrieval, the intermediary will not necessarily be the person who will use them.

The intermediary tomorrow

Having contemplated the factors at work on the intermediary's job, what scope is there in the future? It is possible to look at the likely developments in a positive way. By using a middleman's skill in seeking new opportunities for exploiting circumstances, and by being prepared to change to do this, intermediaries can adapt and find new roles if necessary. The present tensions in the intermediary's job *can* be satisfactorily resolved.

It must be said that there will still be some opportunities for intermediaries in their traditional roles. Not everybody will want to search for their own information and others will still need to go to intermediaries when they need information outside their own field of expertise. But unemployment and increased competition for a reduced number of positions must be expected.

Expanded roles for intermediaries have been suggested in an attempt to forestall their demise or at least to defer doomsday. Perhaps the nearest one to that of the traditional intermediary is that of the information professional as an agent of change, the essential ingredient of a vastly enlarged and upgraded notion of knowledge service.[4] These people would deliberately break into the problem-solving cycles of others at various points, helping them to articulate their problems and search for solutions. Bennett reviews a number of other possibilities for expanded roles for intermediaries.[5] He mentions the educational function, introducing end users to new resources and training them in their use. This applies to intermediaries in public libraries as well as to academic and special librarians. Karen Takle Quinn comes to the conclusion that 'the role that (public) librarians can best play is to use their experience, knowledge and expertise to teach and advise the user how to utilize the services himself'.[6] There is the possibility of working alongside the researcher or end user, critically evaluating information, for those information workers highly qualified in non-information subjects. None of these ideas is new and many organisations already employ individuals in these capacities. Yet there is a new urgency to consider such alternatives in view of future trends and present difficulties in justifying the intermediary's job to management.

All of the functions mentioned so far—traditional searching, problem solving, education in information resources and critical evaluation—need not be done by in-house employees. If employers are not so willing to have full-time information professionals, they may at least require their services occasionally. This opens up opportunities for consultancy services. It is part of a general industrial restructuring that has been occurring in the past decade. Companies, seeking to reduce organisational overheads, are now only employing workers to produce directly or provide a direct service. They increasingly rely on outside contractors for indirect production and services.

The increase and diversification of jobs offering information intensive activities—what was foreseen many years ago as 'the information profession in disguise'[7]—may mean that there is more chance for people to match their real character with an appropriate job. Those who do not have the attributes of a good intermediary may find scope for their different contributions, particularly in the expanding fields of information technology and information production.

If we know or can hazard what the future looks like, then we can start planning for it now. If the future cannot be avoided or changed, we must change ourselves, by education and training, to fit in with it. We must make sure that we really do have all the skills necessary to be good middlemen. At a personal level we will wish to ensure our own livelihoods; at a national level we do not want to waste current and future human resources. Charles Oppenheim gives a personal view of the implications of information technology for courses in information science[8] with which I largely concur. He points out the need for the following to be taught:

— keyboarding and online skills;
— programming and file design;
— interpersonal skills.

All of these are essential if information intermediaries are to be effective today, let alone tomorrow. To them, I would add the need to teach elementary business skills and something about the knowledge industry and mass communications media. There will be a need for more people to have a high level of education in non-information subjects as well as in information science, so that they are able to participate in turning information, especially that in databanks, into knowledge. At this point, the intermediary and the end user merge into one person. Not all of us will be fitted for this role, though, and we will still want a separate 'information function'. However, if there is no response from educators and trainers in the directions mentioned here, then certainly the information profession as an entity will not survive.

Epilogue

But we are not dead yet. At the beginning of this paper I tried to give a moral to the tale but I did not quite finish the story. What happened to the 'A' and 'C' people left on Golgafrincham? The story ends with the revelation that they were all eventually wiped out by a virulent disease caught from a dirty telephone. I will leave you to draw the moral from that yourselves.

REFERENCES

1. BAKER, C. A. Piggy in the middle: observations on the role of the intermediary. Proceedings of the Fifth International Online Information Meeting, London, 8–10 December 1981. 23–4.
2. STONIER, T. *The wealth of information—a profile of the post-industrial economy.* London: Thames Methuen, 1983.
3. BAKER, C. A. Paper presented at a SCONUL seminar on 'Online in academic libraries', Manchester, 26 November 1982.
4. HAVELOCK, R. G. Information professionals as change agents. *Drexel Library Quarterly*, **13** (2), 1977. 48–61.
5. BENNETT, J. L. Expanded roles for information transfer specialists in interactive information management. Information management in the 1980s: proceedings of the 40th ASIS annual meeting, Chicago, Illinois, 26 September—1 October 1977. Vol. 14. Part 1 (printed volume)—abstracts of papers—p. 36; Part 2 (on microfiche)—full papers—fiche 1, frame D14.
6. QUINN, K. T. Technologies—opportunities and challenges. Paper presented at the 1983 conference on public libraries: The challenges of the next two decades, Tallahassee, Florida, 27 February–2 March 1983.
7. HARMON, G. Information science education and training. *Annual Review of Information Science and Technology*, **11**, 1976. 347–80.
8. OPPENHEIM, C. The impact of information technology on information science: implications for courses in the UK. *Education for Information*, **1**, 1983. 125–37.

Information in local government: challenge and opportunity

Professor T. D. Wilson

Department of Information Studies,
University of Sheffield

Paper presented at the Aslib conference 'Information for National Recovery: Needs — Resources — Technology', University of Stirling, Scotland, 13–16 September 1983.

Introduction

IN THIS COUNTRY local authorities perform many tasks in society, from keeping an eye on the quality of goods, through the maintenance of parks and other amenities, to the provision of basic services in education and social welfare. In doing all of this, those concerned get very little in the way of thanks — more often there are brickbats from the monetarist politicians seeking to control public expenditure and from the ratepayers who bear the consequences.

In England and Wales local authorities have varying ranges of responsibilities, depending upon their level of operation (Metropolitan District, Metropolitan County, Shire County, London Borough). Scotland has rather different groups of departments in the health and welfare field, and the position in Northern Ireland is different again. The range of responsibilities in any of these authorities may vary from time to time as legislation changes and other legislation may create new kinds of authorities or cause earlier types to disappear.

Within the variation there are some consistencies:

- all authorities have statutory obligations for the provision of certain services;
- all are accountable for their actions, politically to a local electorate, to auditors, (to a degree) to the Local Government Ombudsman, and to other agencies established from time to time for specific purposes;
- all have limited financial resources, provided by central government and from local rates (and a small amount of other income);
- all have functional structures based on departments with well-defined areas of responsibility (even in those cases where corporate management practices are employed);

Aslib Proceedings, **36** (2), February 1984, p.87–95. Printed in Great Britain

- the nature of work in almost all local government departments is a mixture of bureaucratic and specialist with a 'research' element in some of the *more* specialist departments. The work is generally directed towards the provision of services to the citizen;
- because of the changing environment within which local government departments (like all other organizations) operate, *planning* is a key activity; and
- local government operates in a political climate — not only in the fact that responsibilities and duties are laid down in statutes, but also in the fact that control is vested in local politicians of varying ideological persuasions, with both local and national allegiances.

These common characteristics have consequences for the nature of 'information' in local government, for the kinds of information services that exist, and (more to the point) for the kinds of services that *ought* to exist.

Information services in local government

The consequences for the design and development of information services in local government of the characteristics mentioned above can be considered under several headings.

First, there is the dichotomy of *information versus data*: in spite of the emergence of the idea of 'information science', it is probably still true to say that most of us working in the library/information field continue to view 'information' in terms of some 'stuff' embodied in documents. This is still a viable definition, in spite of the development of electronic services of one kind or another, as a great deal of information is produced and distributed in this way and people are needed to provide efficient means of access. In local government departments. however, a great deal of information consists of raw, or at least partly digested, *data*: for example, census data manipulated in planning departments, data on school rolls in education departments, data on occupied beds in elderly persons' homes in social services departments, data on work loads of staff in virtually all departments, and accounting data in all departments. Research projects such as INISS and LOGI have drawn the attention of information professionals to the role of internal documentation and data and the need for efficient control, manipulation, and access of such 'information' but information workers (even those employed in the specialist departments) seem, in general, to have been slow to apply their skills and talents to these tasks. (Wilson *and* Streatfield, 1977; Wilson, Streatfield *and* Mullings, 1979; Mullings, Francis *and* Wilson, 1981). Equally, those responsible for the management of departments have been slow to recognize that information workers might possess skills relevant to the control of data and documents.

Secondly, the significance of data in local government brings with it a need for the effective manipulation of those data for the production of reports to guide the decision-making and planning processes of local government. The retrieval of data is generally insufficient for the uses to which they may be put, whereas the retrieval and transfer of documents is often assumed by the information worker to be sufficient for the ultimate user. There is, thus, a kind of dichotomy between an orientation towards the manipulation of data and an orientation towards the retrieval and delivery of documents.

Thirdly, there is an associated dichotomy between *internal organizational documentation* and *externally produced publications*. The former often embodies data, often in statistical summaries or aggregations, and usually has a limited life-span and a limited circulation. There has been some attention over recent years to the problem of access to local government documents (Kennington, 1982) and information workers are probably more aware now than in the past of the particular problems such documentation presents. However, the majority of local government information services provided by public library systems to local government officers and members across all departments and committees continue to see their function mainly in terms of aiding access to the published literature. Indeed, such services often have some difficulty themselves in getting access to internal documentation.

Fourthly, there is an operational distinction between internal documentation and external publications: those involved in controlling the flow of internal documents, in creating filing systems for storage, and in devising systems for retrieval, are also involved in the generation or the production of the documentation and, often, in the collection of the raw data. An example would be the research section of a social services department which, on the basis of its research activity (possibly involving access to census tapes for the selection of study areas or households) may produce raw data, embody those data (or summaries of them) in reports to senior management, and may carry out the necessary storage, retrieval, and reproduction activities within the section. Those who control access to the published literature, however, are rarely responsible for a similar range of functions.

Fifthly, because of central goverment concern with public expenditure, because of local concern over rates, and because of accountability to auditors, local authorities are paying increasing attention to cost/benefit analysis of all operations. In the information sphere this has several effects: careful control over expenditure on externally-published materials, over expenditure on staff, over reproduction costs of internal documentation, and over the introduction of computer systems for the manipulation and control of information, however defined.

Finally, the political dimension referred to has an impact upon the kinds of issues that are brought forward for consideration and that demand either data or research; it has an impact on how internal information is presented to members (indeed on *whether* such information is presented); and it has an impact on the significance attached to the value of information services to officers. In recent years, for example, at least one county library service has had its local government information services severely cut, whereas in a neighbouring authority, controlled by a party of a different political persuasion, the local government information service has been restored.

As a result of the factors outlined above, information services in local government operate at several different levels:

- first, there are document-based information services, usually operated under the aegis of the public library service, which underwent a period of considerable growth in the early 1970s. These are generally intended to give service to local government officers but sometimes seek also to serve the elected members;
- secondly, there are individual departmental information services (often associated with research or training functions). These first appeared in planning and architects' departments but, as a result of the impact of local government reorganization and information technology, have spread in recent years into other departments such as social services and education.
- thirdly, there may exist separate services for local councillors — operated either by the public library service or by the chief executive's office — again, there was a vogue for such services a few years ago but few appear to have survived, largely as a consequence of a very low degree of take-up on the part of those for whom provision was made;
- fourthly, there may be information services of one kind or another provided by public relations or press and publicity departments — again these usually operate out of the chief executive's office. The role of these sections is to play a part in presenting an image of the council to the local electorate and other interests and in recording the view of authority as represented in the press, local TV or radio, and in pressure group activity and publications;
- finally, mention must also be made of the fact that local authorities are involved in providing a variety of other information services to the citizen (although this paper is not directly concerned with this activity). This involves such activities as housing advice centres, financial support to citizens' advice bureaux and other advisory agencies and groups, and such things as welfare benefits advice centres.

This diversity of information provision, with its potential for co-operation and its potential, equally, for conflict, is one of the challenges for the information profession. Skilled information workers *can* play a significant role in the integration of resources and services in local government — but they must do so in a 'politically' sensitive organizational environment with due attention to the hazards of 'territorial' boundaries. They need, also, to press the case for their abilities as information resources managers, and it must be confessed that finding the evidence for that case, particularly as it relates to internal documentation and data, will not be easy. There is here, of course, a challenge also for professional education.

Economic restraint, rationalization and information technology

It may appear odd to link these three terms but, in different ways and certainly in opposition to one another, they appear to have been the most significant influences on the development of local government information services of most of the types discussed in the previous section over recent years. Grouping them together in this way serves to draw attention to the fact that not all is doom and gloom in local government — there have been growth areas in the information business, but professionally qualified librarians and information workers have not always been the ones to benefit.

To take economic restraint first: in preparation for this paper I wrote to all public library authorities in England and Wales asking if they could report in a brief letter (with supporting documentation if it was available) what developments had taken place over recent years and what was the impact of economic restraint on those developments.

At the time of writing this paper 38 authorities had replied to my letter. In some cases it was difficult to tell whether any specialized service *was* on offer — respondents in a few cases wrote of providing services as part of the normal functions of the reference library — but in those cases where a service of the kind suggested earlier was provided specifically to either elected members or officers the general impression was that services had been 'squeezed' over the past few years. In 12 cases librarians reported specific effects of the squeeze. The following are fairly typical comments:

> 'In recent years the service has stood still in economic terms.'
>
> 'Retrenchment set in almost at birth and the Unit was withdrawn from County Hall to the principal reference library in 1976 . . . In the same vein, Members have more recently voted to stop distriution of the daily . . . bulletin. It now goes out weekly, to officers only.'
>
> 'As we have suffered a 30% reduction in staffing and book fund and a 40% reduction in periodicals fund in the last three and a half years I would say that we have some experience of weathering the financial squeeze. Quite frankly, I sometimes believe that my sole occupation is the matter of making do with less resources.'
>
> 'The need for staff reductions and freezing of library posts has resulted in the Local Government Information Unit carrying . . . added workload . . . while [being] prevented from taking on additional staff to cope with it.'

The economic squeeze is real, therefore: expansion, and in some cases even retaining existing service levels, has been difficult. Not all is on the gloomy side, however: 7 authorities indicated some growth and development or at least retention of the *status quo*. In some cases this has been as a result of involvement in schemes of co-operation, or buying services equivalent to those that had been lost. For example:

> 'These reductions have led us to avail [ourselves] of the reasonably priced bulletins offered by Cheshire Library Service. Their use, together with our co-operation in the . . . Regional Library System's co-operative indexing programme for periodicals and our circulation of commercial services . . . has enabled us to maintain a reasonable standard of current awareness service.'

The impact of rationalization of departmental functions, partly as a consequence of ideas of corporate management, partly as a result of financial restraint, paradoxically, has enabled some authorities to develop services. For example:

> '. . . [The County Council] has both developed and rationalized, having amalgamated the County Library's Local Government Unit, the County Planning Department's Library (the . . . only significantly sized departmental library) and the Planning Department's correspondence registry. The result has been a unified information service; a saving in terms of stock duplication and staff and, we believe, an improvement in efficiency.'

Clearly, here is one example of rationalization bringing about at least a partially integrated view of the nature of information resources.

The impact of new technology on developments is mentioned in several cases. For example:

> 'Information technology — . . . Libraries now have access to numerous on line services, notably ACCOMPLINE (produced by GLC research library) and POLIS (produced by the House of Commons Library). It is hoped to use these as the basis for producing an SDI service to Members and senior officers.'
>
> 'A "Bulletin" terminal has been installed in the council chamber, on which a brief description of newspaper items of relevance to . . . councillors is displayed on the day of publication . . . The system is still in the trial stage, and as we were only allocated a limited number of pages, this seemed one of the best methods of linking the rapid updating facility of viewdata with the type of current local information a library can provide.'

The three factors outlined above, therefore, interact and in some cases lead directly to conflicting consequences — the squeeze reducing staff and resources, rationalization leading to greater efficiency, and new technology allowing services to be extended. A number of respondents also pointed to the fact that, as all departments in local government have been subject to the same kind of treatment, loss of resources in departments other than the public library service has led to increasing demands on the library service. And always, of course, librarians responding to the demands of the situation as best they can with their clients rarely aware of the trouble being taken.

The effect of these factors upon the information activities of individual departments is rather less easy to establish — it was not possible for me to write to all departments in the same way as I could write to public libraries. The evidence for my statements is less secure and I may be misinterpreting the signs, but a number of developments can be identified.

First, one of the consequences of local government reorganization in 1974 was the creation of larger departments. In the case of social services departments, for example, this brought with it a larger research and training role, and consequently, a wider appreciation of the need for information. The same phenomenon occurred rather earlier in relation to planning departments. In a number of cases information units were established — although not always employing a qualified information worker. In more cases still, existing individuals (office administrators, research officers, training officers) were given responsibility for organizing a department's information resources and new *de facto* units developed as a result.

Secondly, recognition of the significance of the role of information in the management of local government has increased since 1974. This is seen, for example, in the increasing scope of BURISA (the British Urban and Regional Information Systems Association) whose newsletter used to be concerned almost solely with information systems for planning departments. In recent years, however, papers, reports of meetings, and notices of conferences and courses relating to social services, housing, and education have begun to appear and are growing in number.

Thirdly, the impact of information technology has been obvious in a number of departments. For example, in a recent study of county planning authorities, a colleague and I found widespread acceptance and use of microcomputers, mainframe DBMS and program packages for statistical analysis, forecasting and simulation. (Masser *and* Wilson, 1983; Wilson *and* Masser, 1983). Similarly, in relation to social services departments, David Streatfield and I have been running one-day workshops on information management at the National Institute for Social Work and, increasingly, participants are looking for guidance on the applications of IT to the management of data and information. In studies carried out in the EMIE project (Streatfield, 1983) widespread use of microcomputers and mainframe packages has been found in education departments, and follow-up investigations by two Sheffield University students are expected to reveal more about attitudes towards computer systems and their acceptance as part of the functions of such departments. Finally, two local authorities (Cambridgeshire and Nottinghamshire) are involved in the Department of Trade and Industry office automation pilot projects, and other authorities are becoming involved in this development on their own initiative; this is a topic for another paper, but the impact on information systems and services could be quite fundamental.

Challenge and opportunity

From this brief and admittedly impressionistic review of developments in local government information services I think the nature of the challenges and opportunities will be evident. The opportunities open to information workers are considerable: many local authorities are increasingly aware of the information handling problems they face and are looking for guidance on how to solve those problems. That the problems are related to data, internal documentation, and the introduction of information technology rather than to the organization of documents and the dissemination of information about their contents, is, perhaps, a deterrent to some of the more traditionally-oriented members of the profession. For those prepared to take a small step into unfamiliar territory and to gain experience of the problems, however, the rewards could be considerable.

The challenges implicit in the role that could be played are:

- can you persuade the chief executive and departmental heads that you have the necessary skills, or the motivation to acquire them?
- can you think in terms of organization-wide information resources mangagement, or is your view of things bounded by the journal and the book?
- do you have a coherent picture of the role that information technology can play in the management of resources — and can you publicize that role effectively?
- can you evaluate what you do in terms of cost-effectiveness so that the systems and services you establish will be able to survive?

If the librarian or information worker cannot answer 'Yes' to these questions one thing is very sure — someone in corporate management, or management services, or computer services will answer 'Yes' and will be given the job.

ACKNOWLEDGEMENTS

I am grateful to all of the public librarians who responded to my letter of enquiry, often very fully, and enclosing useful documentation.

REFERENCES

1. KENNINGTON, D. Access to British local government documentation. *Social Science Information Studies,* 3, 1982, pp. 195–203.
2. MASSER, I. M. *and* WILSON, T. D. *Approaches to information management in County Planning Authorities in England and Wales: a survey.* Sheffield: Sheffield University, Department of Town and Regional Planning, 1983. (Occasional Paper No. TRP 40)
3. MULLINGS, C., FRANCIS, G. M. *and* WILSON, T. D. *A manual for the investigation of local government information needs.* London: British Library R & D Department, 1981. (Report 5585)
4. STREATFIELD, D. R. The Educational Management Information Exchange (EMIE): a user-based research project aimed at local authority administrators. Paper presented at the 5th International Research Forum in Information Science, Heidelberg, 5–7 September, 1983.

5. WILSON, T. D. *and* MASSER, I. M. Environmental monitoring and information management in County Planning Authorities. Paper presented at the 5th International Research Forum in Information Science, Heidelberg, 5–7 September, 1983.
6. WILSON, T. D. *and* STREATFIELD, D.R. Information needs in local authority social services departments: an interim report on Project INISS. *Journal of Documentation,* **33**, 1977, pp. 277–293.
7. WILSON, T. D., STREATFIELD, D. R. *and* MULLINGS, C. Information needs in local authority social services departments: a second report on Project INISS. *Journal of Documentation,* **35**, 1979, pp. 120–136.

User education in the online age

Dr. Ray Lester
Librarian, London Business School

Paper presented at Aslib conference 'Information for National Recovery: Needs—Resources—Technology', University of Stirling, Scotland, 13–16 September 1983.

THE PRIME IDEA of 'user education' has been to teach present and prospective users of libraries and similar information services[1] how to find the information they need. Users need to be educated in the proper use of libraries: effective library use is not a naturally endowed skill. Or we might say: 'user education' is needed either because our libraries are really rather complicated to use; or it is needed because users are not normally at all sophisticated in their approach to libraries, and left to their own devices they simply cannot find the information they need; or it is needed for a combination of both those reasons.

Let us leave aside discussion of the degree of library user sophistication, for the moment. If we made our libraries as simple to use as, say, a bank cash dispensing point, then perhaps 'user education' would not be needed at all. Indeed, if in the future the information people needed could all be retrieved from something like a cash point, then just as we, as library managers, need less and less to go into our bank branches to do business, so existing library users would need less and less to use library 'branches'. Eventually, libraries might disappear altogether.

These thoughts have either frightened or excited writers in the professional literature. We have had frightening predictions of 'doom',[2] with all of our libraries rapidly being closed down, and librarians becoming 'as rare as wheelrights and coopers'.[3] Or we have had exciting predictions of a glorious future as librarians become 'information resource managers', or some such,[4] managing great networks of computers and other pieces of information technology, wherein is stored every piece of information their organization needs. For those of us who rather enjoy being traditional librarians, and proudly showing off our collections to visitors, all this would have been bad enough. But we have had other pressures to contend with. For a number of years virtually all librarians have not had enough money to maintain their collections in the manner to which they had become accustomed. Not only that. The recent prevailing political climate is one which questions all services which are budget-funded—as, generally, are libraries—rather than sold in the market-place.

Aslib Proceedings, **36** (2), February 1984, p.96–111. Printed in Great Britain

What is to be done? One answer increasingly given is 'user education'. If existing and non-existing but potential users of our libraries were educated properly in matters concerning 'libraries', then they would realize how valuable libraries really are; and they would demand that they be preserved at all costs, and exempted from all of the 'cuts'. Then our futures, as librarians, would be secure. Or, if you believe in the inevitability of the paperless all-electronic society, 'user education' would serve to demonstrate the absolutely crucial importance of 'information', whatever its physical expression; would show that managing it as a resource is really quite difficult; and would identify librarians and other information centre managers as absolutely splendid people to undertake the task. Again, our futures would be secure.

If you detect a note of cynicism in my comments so far, you would not be wrong. Regrettably, it has to be said that much of the literature on 'user education' and related matters—though fortunately not all—is at this level of debate. The abstract of this paper which was printed in the 'Conference Handbook' is a good example of the type of unhelpful approach which has been common:

> Suddenly, the skills of those who 'know' about indexing and classification are in high demand. After one or two disasters, the creators of our 'offices of the future' have realised that there is more to information retrieval than they had first thought. We cannot just pour all our information into a great database cauldron, inject one or two commands into the database furnace, and—hey presto!—out comes exactly the information we need. Or can we? If our database systems are sufficiently 'expert', might not this be just what can achieved? And what need then for 'user education'—when all users need to know is how to enter a few commands into their computer work stations. That only takes five minutes to demonstrate.

Anyone can write at that sort of level. But to go further and define precisely who should do exactly what, for whom, when, where and how, let alone why, as regards 'user education', is extremely troublesome: at least, I have found it so.

One group of people who have been grappling with these questions comprise a Working Party of the English Library and Information Services Council (LISC).[5] The LISC 'Working Party on Manpower Education and Training' have recently produced a *Discussion Paper on User Education.*[6] As clearly this is an important report issued specifically to stimulate discussion and debate, I have decided that I should use this occasion to summarize and comment upon its main recommendations. (The report is also very well written and presented.)

The Discussion Paper starts by defining the users of libraries (and similar information services) as:

> . . . people who seek to draw upon the fund of knowledge which they—or more usually, others—have generated and recorded in the past.

It divides users into four sectors:

> 1. The education sector, including universities, polytechnics, colleges and schools. Within these institutions, there is a wide range of users—pupils and students, vocationally-based learners, teachers, research workers and other academic staff.
> 2. Industry and Commerce, covering enterprises which range from small firms to large companies or corporations. The users include directors, principals, managers, secretaries, professionals, heads of operational departments, specialists in 'staff' functions, or scientists or technologists engaged in research and development.
> 3. Government—central, regional and local—in which the users include elected members (and others involved in the legislature) administrators, specialists and clerical workers in the executive, and members of the judiciary.
> 4. The public at large, served by public libraries, community information services, and more specialized libraries and information services which cater for groups within society.

But the Discussion Paper quickly recognizes that use of information resources is not constrained by these demarcation lines. Thus it suggests a different taxonomy:

> —persistent and intensive users of the available resources;
> —other groups who may be encouraged or persuaded to become users on a more or less systematic basis;
> —still others who, in the past, have rarely if ever crossed the threshold of use and see no reason to do so.

The report points out that:

> In practice, the 'infrequent or nil' users of libraries and information services often rely heavily on informal sources . . .

It also feels that among this group:

> . . . often there is not even an awareness of the need for access to organized information sources. Still less is there recognition of the opportunities for satisfying the demands which do exist.

The Working Party readily admits that 'libraries':

> . . . may have only a part to play in aiding the unhampered flow of . . . available knowledge, new ideas and methods.

Yet:

> . . . it is manifestly important to take steps which will improve the information consciousness of users, and their ability to make the best use of the resources which are available. User education should play a vital role in achieving these ends.

Before traversing further through the Discussion Paper, it would be as well to have a definition of 'user education'. One of the many virtues of this LISC report—as will be apparent from the quotations just given—is that it stresses that libraries are only one source among many by which people acquire information. Individuals make great use of informal as well as formal information sources; the formal sources encompass a tremendously diverse set of organizations and organizational frameworks; they might be either publicly or privately funded, or a mixture of both; the information itself is sensed either aurally or visually (or both); and during its passage from source to recipient increasingly it will travel is an electronically coded form for at least part of the journey.

However:

(a) Since this is a report of the Library and Information Services Council, I believe that we may safely assume that the Working Party gives high priority to the well-being specifically of libraries rather than of other participants in the information transfer process. In this paper, similarly, I am primarily concerned with the Working Party's recommendations in respect of libraries, rather than of other sources of information.

(b) Second, I would like to confine our attention to 'publicly available information'.[7] I am not concerned here with any roles libraries might have with information that is not generally available to the public at large.

(c) Third, I have in mind libraries that depend on budget allocations in order to provide all or most of their services—and which, therefore, have to find means of persuading those who fund their operations (the LISC Discussion Paper designates these people as 'funders') to continue funding; rather than those libraries that derive their income from selling information directly to their customers.

So, focussing in these ways, what do the Working Party mean by 'user education'? About two-thirds of the way through the Discussion Paper we read:

> In general terms, the objective of user education programmes is to improve the general level of fact gathering and evaluation in problem solving—that is, user education can be defined as the transfer to individual users of the techniques by which they can specify their needs and acquire, evaluate, organize and communicate information.

That paragraph is part of a section in the Paper labelled 'Promoting "informacy"', where 'informacy' is conceived as a basic skill, to be taught alongside 'literacy' and 'numeracy'. Now, provided that such 'informacy' teaching is carried out by school teachers and lecturers as part of the normal educational process, and not by librarians, personally I would fully support this concept.[8] Thus we should welcome the Working Party's first of six recommendations:

Recommendation 1

> A campaign should be developed and launched by the professions with Government support to promote 'informacy', especially in schools and colleges, along the lines of the campaigns to promote literacy and the wider use of information technology. As an indication of the funding which might be required, it was noted that the IT82 campaign received £2.57 million in Government funding. The unit to promote literacy and basic skills has annual funding of £1.3 million.

But the report also delineates a second objective of 'user education' programmes, apart from 'promoting "informacy"'. This is: 'Promoting the use of specific facilities and services.' It is this second objective that I now wish to examine in a little detail.

If we extrapolate from the taxonomy given earlier in the paper, it is clear that the Working Party would consider 'educated' those people who are 'persistent and intensive users of the available resources'. A major objective of user education programmes presumably then is to: identify and interact with 'other groups who may be encouraged or persuaded to become users on a more or less systematic basis'.

If here for 'user education' we could simply substitute 'marketing', all would be well. None of us would dispute the need for each and every library to market its services to its individual user population[9]—both those who are currently actual users of the services provided and those who are not.

But the Working Party goes further. Its members obviously believe that there are a large number of users who have not been or will not be encouraged or persuaded to become users of library services by straightforward marketing. Thus those users will continue to be deprived of important and crucial information. The result of that deprivation, then, is that wheels are reinvented, projects falter, the wrong decisions are made, and so on—all because the people involved did not find and use information that was readily available within libraries.

In order to persuade these stubborn non- or partial users of library services to become properly accredited users of those services, something more than mere marketing is needed. Thus the Working Party are proposing that a series of 'demonstration projects and case studies' be constructed, which they believe will prove to a sceptical community—both 'users' and 'funders'—just how valuable the information held in libraries really is.

Recommendation 2

> To promote wider and more effective user education, steps should be taken to foster cooperation between libraries and information services and other groups which have complementary interests—for example, cooperation with teachers in schools; with publishers, booksellers and suppliers of electronic

> products and services; and with intermediaries (such as local business information officials and agencies assisting small firms). Demonstration projects and case studies should be commissioned; and the subject of Information Studies should be brought formally into the curriculum at GCE Advanced Level.

I must confess that when first I scanned through the Discussion Paper, I feared that the aim of the 'demonstration projects and case studies' would be to show how information held in libraries had directly assisted users in their problem solving. Library researchers have been trying to demonstrate that for years, and the results—at least those I have heard about—are hardly such as to convince the sceptic of the importance of libraries. But now I sense that the aim of the 'demonstration projects and case studies' is to show how specific user education initiatives have been successful in encouraging or persuading people to become more regular and systematic users of the services offered by libraries.

There is absolutely no doubt that a large proportion of our population is 'information disadvantaged', often lacking simple basic information which, if known, would enrich their personal lives. The relatively recent re-direction of many of our public library services towards providing 'community information', even 'community advice', I believe is most certainly to be welcomed.[10] Surely we would all fully support resources being publicly allocated towards setting-up demonstration projects and case studies in this area—particularly if this leads to a more effective co-operation between libraries and the other units involved in the information transfer process.

Our support for the various types of initiative suggested in the LISC Discussion Paper should, I feel, also extend into the area of the 'small business'.[11] Again, libraries can do a great deal towards helping small businesses grow—as we would hope—into large businesses.

But this conference is about 'Information for National Recovery'. And this country's or any other country's 'national recovery' is not going to depend on whether people in their personal lives are or are not information disadvantaged. And—despite statements in some quarters to the contrary—it is not going to depend—at least in the short to medium term, on the performance of small businesses. Our national recovery is going to depend on the performance of key individuals working in medium to large-size organizations, both within the public and private sectors. And to imply, as does the Working Party, that our national recovery has faltered to date because those whose direct concern it is are not persistent and intensive users of libraries, is nonsense.

Of course, the Discussion Paper does not actually say such a thing; and I must stress that fact. As I have indicated, it mentions all the right topics: the importance of other channels of information transfer apart from libraries, the importance of invisible colleges, of technological gate keepers, and so on. But, at the end of the day, instead of saying: 'Look, there are broadly two sorts of people, the 'information disadvantaged' and the 'non-information disadvantaged'. Government ought to do something for the first group, but not for the second, as regards 'library user education'.' Instead of saying that, the Discussion Paper says, in effect, that we do not really know why some users do not use libraries very much: we need more user studies.

Recommendation 4

> In the proposed demonstration projects and case studies, a concentrated effort should be made to identify and apply relevant findings from user studies. For the future, more 'time series' and longitudinal surveys and evaluative studies should be supported to provide better information on the conditions and strategies which produce success.

The Discussion Paper similarly says, we do not really know why some 'funders' are reluctant to fund library services, and so we need more research on that too:

Recommendation 5

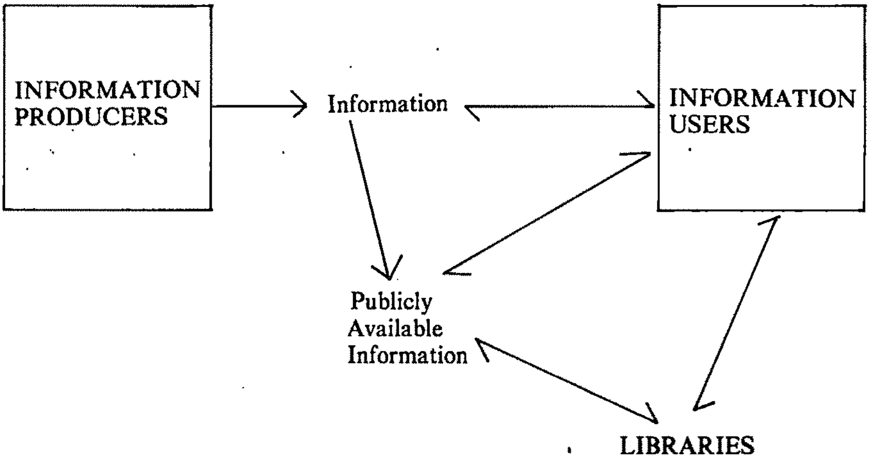
> Research should be commissioned to discover more about the factors which influence funders' attitudes towards (and decisions on) library, information and electronic services and products.

I would submit that we know more than enough about the users, and non-users, and the funders and non-funders of library services for the non-information disadvantaged, for us to make decisions on what is to be done. In the remainder of this paper I shall attempt to summarize that knowledge.

Interim summary

First, a summary of the argument so far (Figure 1). Of all the information in the world, we may designate a sub-set 'publicly available information'. We

Figure 1



have been concerned with the role of libraries and similar information units in facilitating the transfer of such information from those who produce it to those who need to use it. We have noted that 'informacy' skills are not taught as part of the normal educational process: we believe that they should be. Partly for this reason, people in their personal lives and when starting-up businesses are sometimes 'information disadvantaged'. Public libraries have an important role in alleviating this situation by helping to educate users in the effective use of libraries and other information services. But we are arguing that public libraries, or libraries generally, do not have this role with those whose use of information must necessarily be more sophisticated.

Libraries and the non-information disadvantaged

I have grouped the comments I would like to make in support of that latter contention under seven headings.

1. *The unimportance of libraries*

Libraries have never been particularly important as sources of new, fresh information for 'professionals'. Brittain, in a recent review of library user studies,[12] writes that:

> one of the findings that is common to nearly all the studies is that users do not like bibliographical tools for information and document retrieval, do not use them rationally and systematically, and much prefer (often by a factor of 10:1), informal to formal channels of information.

Michie, in his book *Machine Intelligence and Related Topics*,[13] makes the same point, specifically with regard to scientists. He summarizes a survey which aimed to find out where scientists find their technical information:

> It turns out that reading technical papers and books (not skimming, not going to the library and running through the titles in the journals, but sitting down and reading connected prose) is something to which the scientist devotes little time. On the other hand he spends much time on alternative methods of gathering information. He thumbs rides on other people's mental work. He calls up a colleague or walks down the corridor. He will go to enormous lengths to get the information out of a 'question-answering machine made of meat' to paraphrase Minsky, rather than be driven to read it up for himself. What is more, he is right. The scientist, like everyone else, is busy. He insists on his information being as much as possible predigested. The difficulty and inconvenience of retrieval from the raw state is such that scientists go out of their way to avoid it.

Michie has his solution to this problem—if it is a problem; and it certainly is not 'user education'! The interesting point is that the survey whose results Michie summarizes was carried out nearly thirty years ago! We have *known* about these things for a long time—if ever in our hearts we suspected otherwise. For the way Michie describes scientists proceeding in their information gathering is exactly the way we as information scientists and librarians proceed. Take the LISC Report[6] which I have made such use of in this paper. If I hadn't happened to have mentioned to a member of the LISC some months ago that I was due to give this paper, almost certainly I would be unaware still of its existence. For it is only now about to enter the formal (grey) literature. Yet how silly it would have been not to have used this opportunity to comment on its recommendations.

Of course, the reason that many of us as practising librarians have failed to act upon the findings of the innumerable 'user surveys' carried out in the last thirty years or so is clear. As Brittain says:

> Obviously the implications would have been too unpleasant to face—in some institutions the logical conclusion would have been to disband the formal communication and library service altogether.[12]

2. *Costly ignorance*

Yet, you will reasonably say, it is still the case that things go wrong that could have gone right if only the decision makers involved had used the information available in libraries—rather than relied on their friends and colleagues. To use Patrick Wilson's phrase,[14] not only is there ignorance, but there is *costly ignorance*: ignorance that proves costly either to people themselves, or to their organizations, or to society generally. Surely if these decision makers had been educated properly in how to find information in libraries, these things wouldn't happen.

You may remember that at the start of this paper I rather cynically suggested that user education is needed either because our libraries are difficult to use or because our users are unsophisticated in their approach to our services. On the first question, I would submit that, despite all our efforts, libraries will remain—as long as they exist as such—difficult to use: more so or less so, depending on what you are trying to achieve. The publications we handle come in such a variety of logical and physical forms; and the commodity those publications carry—information—can be so difficult to pin down, to index and classify.

In this context, it was so comforting to read in a recent important report from the US National Commission on Libraries and Information Science:[15]

> The term 'information' was repeatedly used in the Task Force discussions, but it was impossible to arrive at an agreed upon definition . . . Despite the appearance of a general understanding of the term, it simply eluded definition.

Einstein's aphorism is appropriate here,[16]

> Everything should be made as simple as possible; but not simpler.

3. *Management education*

That may well be the case, you may agree. But, surely, something should be done for the users: because—really—they often are very dim! Well, we have already agreed that the best solution is to 'catch them early': everyone should be educated in basic 'informacy' skills as part and parcel of the normal educational process. But what about those professional users of information who have left the formal educational system?; or who will not yet receive 'informacy' training—though still within that system?

We have already noted that the speed of our national recovery will be dependent primarily on the performance of professionals within medium- to large-size organizations, in both the public and private sectors. It will be dependent on the performance of the managers of those organizations.

One of the grave problems that Britain faces is not that its managers are not well educated in how to use libraries and find information; but that its managers, in comparison with managers in most other developed countries, are not well educated, full stop!

Table 1 summarizes the situation at the end of the 1970s.[17] And as regards the UK's propensity to promote managers from the shop floor, it can be supplemented by some more recent data published in the *National Institute Economic Review*.[18] In a comparison of the United Kingdom with West Germany, the UK's total output of graduates was not so much a concern (though Germany's balance of subjects of study had a more applied and vocational emphasis), as was the deficiency in intermediate qualifications. Sixty per cent of the German workforce had attained an intermediate qualification—of the apprenticeship variety—compared with 30 per cent, at the most, in Britain.

Given this overall situation in the UK, is it surprising that the majority of our managers are unwilling to interact with formal information sources? Organizations such as my own are doing what we can to raise the level of management education in this country; but inevitably it will take a long time for us to catch up with other countries.[19]

4. *Organizational considerations*

There is a further important problem area. In any organization but the very smallest, inevitably there will be a specialization of job function, in two ways. First, there will be hierarchical specialization, in the sense of managers and subordinates—best exemplified by the manager and his or her secretary. This can be rather crucial for libraries: it will often be the secretary who searches for information rather than the manager. Thus logically if anyone is going to be educated as a library user it should be that person. Edwards, at an Aslib/CBI seminar last year,[20] told of ICI's efforts in this direction with videotex information systems.

Second, we will, of course, have functional specialization. This means that although managers may function quite satisfactorily information-wise within their own professional subject area—as lawyers, or scientists, or economists, or market analysts, and so on—outside of the specific competency of each individual, difficulties will often arise.

TABLE 1. *Major differences in the background and education of managers in five countries*

	Great Britain	*USA*	*Germany*	*France*	*USSR*
Social class background of managers	Mixed/low	Mixed/high	High/mixed	High	High
% of graduates in management	Low	High	High	High	High
% of graduates in population	Low	High	Low	Low	Medium
Main subjects of study (undergraduate)	Liberal arts Science Engineering	Liberal arts Engineering Science	Engineering Business economics Law	Engineering	Engineering
Main subjects of study (post-graduate)	Management Engineering	Management Engineering	Engineering	Engineering	Engineering
Full-time versus part-time education	P-T high F-T low	P-T low F-T high	P-T low F-T high	P-T low F-T high	P-T low F-T high
Likelihood of having been promoted from the shop-floor	High	Medium	Low	Low	Low

Figure 2

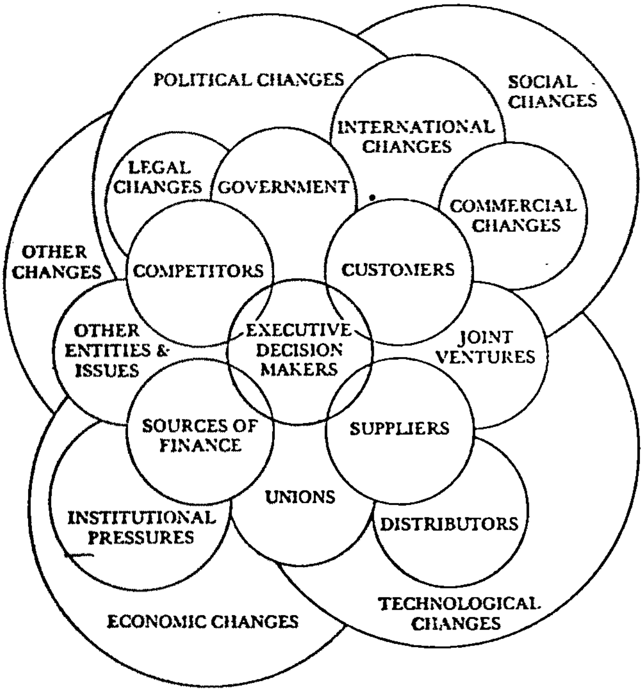
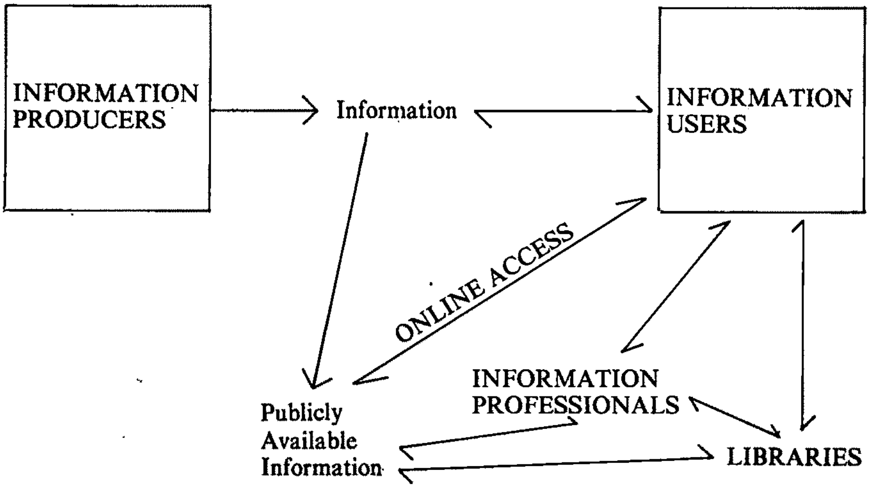


Figure 3



Given the complexity of modern life (Figure 2),[21] again, is it at all surprising that those managers who do manage to be effective information seekers within their chosen discipline, tend to be at a bit of a loss outside of that discipline?

Within the organization, the problems of trying to achieve an optimum information equilibrium have received great attention. There is a vast literature on the broad area of what has become known as Management Information Systems—MIS. But although the situation is changing, many of you will have had the same experience that I have had. We pick up a book with a likely title—such as Tricker's *Effective Information Management: Developing Information Systems Strategies*.[21] Full of hope, we turn to the index and look up 'libraries': no entry. We look up 'information services': no entry. We scan through the entries starting with the word 'information'—looking for some recognition by the writers of the book that external information—information external to the organization, and the currency of libraries in the context of this paper, is perceived to be an important component of management information systems.

Often there is no recognition: the whole book is concerned with a discussion of how managers make decisions; and then at much greater length, how the use of computers has changed, is changing, will change (usually 'will change': very few of the systems that are written about are truly operational)—will change and revolutionize managers' lives.

Tricker's book is better, because it does adopt a realistic critical approach to information system design. And, apart from having three pages out of 200 devoted to external online database systems, it actually mentions libraries!—though not in the index to the book:

> Another idea . . . is the information centre, in which people who know the contents of the databases and how to access them, provide an interface with the users. As the scale and detail of corporate databanks expands, so it becomes more necessary to offer potential users the services of an expert in the available data—just as a librarian plays a vital role in the modern library. Indeed, the two roles are converging.

5. *Information resource management*

The important lesson to be drawn here is not: 'Oh, at last my library user population is realizing how important external publicly available information really is. Now I can show them that tape/slide on "How to search Social Sciences Citation Index"'! No: the real message is quite different. External information is certainly becoming relatively more important as a resource:[22] this partly because organizations have squeezed as much efficiency as they can out of other resources; and partly because we now have the means to move information instantly from any point on the globe to any other point. But in order to capitalize on the external information resource, the managers in organizations will need access to people who are skilled in handling information—particularly non-numeric information—within a computing/telecommunications environment.

There is absolutely no suggestion in anything that I have read written by managers—by users, as opposed to written by librarians, that managers in general wish to be educated in the details of searching online systems. That is the case, unless the managers need to interact with external information intensively, as part of their job role; and it will be the situation until the online information retrieval systems are exceedingly simple to use.

6. *The online age*

No doubt, artificial intelligence techniques will eventually generate online information systems that the non-information professional or non-specialist user can use successfully to retrieve any information in the external environment that he or she needs. Personally, I will be surprised if we reach that stage before the year 2000; but we shall see. The problems of achieving the truly online age are not so much technological—though these are of course considerable. For example, those of us who attended the presentation by Edward Heath and others of the IRIS system at last year's International Online Conference,[23] wondered how exactly 6,000,000 words per day were going to be 'syntactically analyzed' to produce relevant output for the users of the system. But the truly major problems of reaching the online age are non-technological: economic, political, legal, organizational: they are of great magnitude—and, of course, they are the reasons why IRIS itself failed.[24]

7. *The information professionals*

Until we reach that golden 'online age', obviously there will be a role for people we might generically term the 'information professionals': people whose job is to act as some sort of intermediary between those who produce information, and those who need to use it. People who do not actually use the information they process themselves for problem solving; but who repackage it into a form that is better suited for use by the user of the information: the 'end user' (Figure 3).

The prime dichotomy in 'user education' has always been between those who feel that the aim of user education should be to teach present and prospective users of libraries how to be as good as a good librarian at finding information; and those that feel that this aim for almost all users is quite inappropriate; and who feel that there will always be a need for librarians to act positively in finding the information users need—at the time and in the place that they need it.

It will be clear that I am firmly in the second camp. To strengthen my position I can do no better than quote from Line's opening paper at the recent 'International User Education Conference'.[25] Instead of formally educating users, he said that:

> I would much rather we directed our energies and our resources to serving users, first by making our libraries as usable as possible, then by offering our customers a positive information service, which is in any case the best way of getting them to learn. The emphasis should be on good communication and

> transmission, rather than on better reception of poor transmission. A gram of help is worth a tonne of instruction, and one accessible, informed and helpful information officer is worth a dozen user education programmes.

Summary

In summary, I have indicated a number of reasons why we should not support the allocation of public funds to research on, or provision of, 'user education' for non-information disadvantaged people. As channels of information supply, the informal routes are far more important than the formal routes; such inefficiency as there is in use of formal sources is part of a general management education problem, rather than a specific library education one; where retrieval from formal sources is complicated—as often it will be until we reach the 'online age'—it makes sense to designate 'information professionals', whose job it is to hunt through the available information sources and pick out material for the end user.

You may have noticed that in the quotation from Tricker's book on 'Effective Information Management'[21] that I used earlier, he did not write: 'As the scale and detail of corporate data banks expands so it becomes necessary to offer potential users the services of someone who knows what data is available'. No; instead he wrote: 'As the scale and detail of corporate data banks expands, so it becomes necessary to offer the services of an *expert* in the available data'.

The real question that we should be tackling is not whether our users should be educated to retrieve information for themselves, or whether we should do it for them. It is the extent to which, as a profession, we are prepared to prescribe rather than simply to supply.[26] Not to say to our users: 'I have searched through the literature, and these items should be relevant'. But, 'Here is a state-of-the-art summary of the best that has been written in the literature'.[27] At first sight, it has been surprising that the number of 'information brokers' has not grown as fast as some of us expected, at least in the UK.[28] Surprising, until one looked in detail at the services 'information brokers' were offering.[29] For most were not offering, to use Michie's phrase,[13] pre-digested information; they would only provide the familiar list of bibliographies, current awareness bulletins, online searches, and so on. Why pay an information broker, when your local librarian will do more or less the same thing, and usually for free? Of course, information brokers do exist who will offer to evaluate the information they process; but these people usually trade under a different name: they are called *consultants*.

Because most librarians are unwilling, or unable, to be 'bibliographical consultants', they must remain 'bibliographical aids'.[30] This especially as long as those librarians cling to the notion that information is a 'public good' that should be freely available and free of direct charge to all who demand it; rather than sold in the market place as a commodity.

In the face of all the pressures I have indicated, must libraries and librarians wither away and die? Not yet. For they have one trump card which personally

I believe will last them for decades to come: *document delivery*, the supply of copies of documents whose details are known or, more often, partially known by their users. It is to the improvement of our local, regional, national and international document supply systems, and of their supporting bibliographical apparatuses, that such necessarily limited public funds as are available should be directed; rather than to trying to educate professional users of information in how to find yet more information that they certainly are not demanding, and almost always do not need.

REFERENCES

1. In this paper I shall use 'libraries' as a generic term to include all those units that function broadly as libraries, even if not formally designated as such.
2. LEWIS, D. A. Today's challenge—tomorrow's choice: change or be changed *or* the Doomsday Scenario MK. 2. *Journal of Information Science,* **2**, 1980, 59–74.
3. PRATT, A. D. *The information as the image.* 1980, 106 (quoted in CRONIN, B. *The transition years: new initiatives in the education of professional information workers.* Aslib Occasional Publication: in press.)
4. LEVITAN, K. B. Information resource(s) management—IRM. *Annual Review of Information Science and Technology.* **17**, 1982, 227–66.
5. New LISC working party. *Library Association Record,* **83** (12), December 1981, 565.
6. LIBRARY AND INFORMATION SERVICES COUNCIL. Working Party on Manpower Education and Training. *Discussion Paper on User Education.* June 1983.
7. 'Publicly available information' is still largely synonymous with 'publications'—but is preferable because it does not have the restrictive connotation of print-on-paper documents.
8. LESTER, R. Why educate the library user? *Aslib Proceedings,* **31** (8), August 1979, 366–80.
9. CRONIN, B. (editor). *The marketing of library and information services.* Aslib Reader Series, volume 4, 1982.
10. BUNCH, A. *Community information services.* London: Bingley, 1983.
11. *Information and the Small Manufacturing Firm.* Edinburgh: Capital Planning Information, 1982.
12. BRITTAIN, J. M. Pitfalls of user oriented research, and some neglected areas. In: *International Research Forum in Information Science.* 4th Proceedings, 1982, 213–27.
13. MICHIE, D. *Machine intelligence and related topics: an information scientist's weekend book.* London: Gordon and Breach, 1982.
14. WILSON, P. *Public knowledge, private ignorance: toward a library and information policy.* Westport, USA: Greenwood Press, 1977.
15. US NATIONAL COMMISSION ON LIBRARIES AND INFORMATION SCIENCE. *Public Sector/private sector interaction in providing information services.* Washington: NCLIS, 1982.
16. Quoted in reference 21 below.

17. SWORDS-ISHERWOOD, N. British management compared. Quoted in: PAVITT, K., (editor). *Technological innovation and British economic performance* (Science Policy Research Unit, Sussex). London: Macmillan, 1980, 88–99. *See also*: BARRON, D., BALL, R. J. *and* LEAVITT, H. J. The three Stockton lectures on 'Management Education'. *London Business School Journal*, **8** (1), Summer 1983, 3–23; Britain's MBAs: a degree of rarity. *Economist*, September 17, 1983, 82–3.
18. PRAIS, S. J. *and* WAGNER, K. Some practical aspects of human capital investment: training standards in five occupations in Britain and Germany. *National Institute Economic Review*, Number 105, August 1983, 46–65.
19. It is of interest that my own business school has recently appointed a former library school lecturer to a faculty post of Lecturer in Information Management.
20. *Information technology and organizational change: assessing non-technical factors.* Aslib/CBI Conference, 27 October 1982, London.
21. From: TRICKER, R. I. *Effective information management: developing information systems strategies.* Oxford: Beaumont Executive Press, 1982.
22. Because the scale of increase does not seem widely known, it is worth noting that the latest (Fall 1983) edition of the *Directory of Online Databases* (Cuadra Associates) lists 1878 databases now publicly available from 927 database producers via 272 online services. This compares with 400, 221 and 59 entries respectively in the Fall 1979 edition of the same Directory.
23. International Reporting Information Systems. *Inform*, Number 44, May 1982, 1.
24. JORRE, J. ST. The infotech dream. IRIS: the rise; IRIS: the fall. *Observer*, **17**, April 1983, 21; 24 April 1983, 21.
25. LINE, M. Thoughts of a non-user, non-educator. Paper delivered to 3rd International User Education Conference, Edinburgh, July, 1983.
26. ASHEIM, L. Librarians as professionals. *Library Trends*, **27**, 1978–79, 225–57.
27. NIELSEN, B. Teacher or intermediary: alternative professional models in the information age. *College and Research Libraries*, **43**, May 1982, 183–91.
28. 'When this book was being planned, I envisaged a chapter entitled Pioneering Information Brokers, outlining the services of about 20 freelance information services which surfaced in the late 1970s. Research revealed that this "new wave" had disappeared without trace.' SMITH, G., *Business Information Sourcebook.* Hartlepool: Headland Press, 1983, 105.
29. *The future of information brokers in Europe.* Paris: Centre d'Information des Banques de Donnees, 1982.
30. WILSON, P. *Two kinds of power: an essay on bibliographical control.* Berkeley: University of California Press, 1968.

Library and Information Networks in Western Europe

Jack Burkett

There are so many different kinds of organisation — national, regional, and international — active in every subject field and creating a vast amount of new and modified information, that a need exists for guidance in the face of this complexity. Even within some large international organisations, particularly those which have their component divisions geographically scattered, not everything is known by the employee about the body within which he or she works. It was to satisfy this need that the author prepared the present survey, following the style of his earlier publication *Library and Information Networks in the United Kingdom* (Aslib, 1979).

Throughout the international scene, in every discipline and profession, there exists collaboration in activities that engender information. So we arrive at *networking*, a concept that implies connectedness, co-operation, resource-sharing, and relationships at different levels: individual, group, institutional, etc.

There exist many kinds of information network, ranging from information transfer through committee meetings, conferences, seminars and workshops, to computerised database systems. Most organisations, especially the larger ones, use both the people-based systems and the machine-based systems. The present volume deals comprehensively with all of these elements of the international network scene.

ISBN 0 85142 168 7 1983
UK £11 (£9.50 Aslib Members)
Overseas £13 (£11 Aslib Members)

Aslib Publications
3 Belgrave Square
London SW1X 8PL

World Labour Report

Volume 1

A mass of relevant information has been sifted in the preparation of this volume in order to provide a quick and reliable means of understanding the complex realities of the social and labour scene in the world. Specialised studies give the most significant elements in order to produce an objective survey of social and labour questions in which the salient facts and most perceptive commentaries are presented. This volume covers the employment problem; trends and problems of income and wages; social security in industrialised countries; and the impact of technology on employment, working conditions and industrial relations. A statistical annex provides international data on the structure of the economically active population, income distribution and the cost of social security.

ISBN 92-2-103604-9 £12.85; SF45

Into the twenty-first century: The development of social security

Ten eminent experts were commissioned to examine the arguments concerning the current role of social security and the scope for its future development and this is their report. It sets out a coherent philosophy for developing social security over the next 20 years and beyond. The experts argue that the current 'crisis' is a symptom rather than a cause of the present economic recession and that the cure must be found in wider economic policy. Adaptations and extensions are suggested to provide for new lifestyles, to give equal rights to men and women, to make provisions for further risks, and to improve the response of social security institutions to the needs of different users. The battle against poverty is in the forefront of the aims of the social security policies.

ISBN 92-2-103631-6 £6.40; SF22.50

Year Book of Labour Statistics, 1983

43rd edition

This new edition of the *Year Book* provides a mass of data from a vast network of authoritative sources throughout the world of information in statistical form. It covers the active population, consumer prices, labour costs, occupational injuries and industrial disputes. Separate data by sex are shown for employment, unemployment, hours of work and wage series usually covering the last 10 years. The texts, headings and notes are in English, French and Spanish for easy reference.

ISBN 92-2-003589-8 (hard) £34.20; SF120.00

Legislative Series

A valuable tool for those wishing to follow the trend of labour legislation throughout the world, the *Series* is designed to meet the increasing demands of a changing world. Published 3 times a year now, it will contain:

- legislative texts on labour and social security recently issued in various countries.
- legal analyses
- a chronological index, by country, of statutory provisions

Annual subscription: £15.70; SF55

(Free specimen copy available on request)

A catalogue of ILO publications is available on request

INTERNATIONAL LABOUR OFFICE

Branch Office
96/98 Marsham Street
London SW1P 4LY.
Tel: 01-828 6401

ILO Publications
1211 Geneva 22
Switzerland
Telex: 22 271 BIT CH

Aslib Proceedings

VOL. 36 NUMBER 3 MARCH 1984

56th ASLIB ANNUAL CONFERENCE INFORMATION FOR NATIONAL RECOVERY: NEEDS—RESOURCES—TECHNOLOGY

Session 3: Adapting and 'packaging' information

Information in the manufacturing industry: an assessment and proposals for improvement 113
George Rzevski and D. J. Farrar

Commercial information: packaging for innovative services and accelerated recovery 118
Tom Cannon

Information and action in professional decision-making 126
Dai Hounsell

Information in national planning—a developing role 136
Norman Higham

Updating managers—assessing the case for a radical approach to retraining 144
Rowena Mills

Progress in Information Sociotechnology: the ten-year syndrome 154
A. E. Cawkell

ISSN 0001-253X

Volume 36 MARCH Number 3

Aslib Proceedings carries papers given at Aslib meetings and conferences, and contributed papers of interest to practising professionals. These describe innovations in information management techniques, applications of existing information products and services, and case studies of information units and special libraries. The contents of the journal are reviewed by an editorial board.

Aslib Proceedings is published monthly and supplied free to members of Aslib. Annual subscriptions to non-members: £45 (UK)/£53 (overseas); additional subscription to members: £26/£31. Single copy prices and subscription information are available from the Subscriptions Department, Aslib, 3 Belgrave Square, London SW1X 8PL.

Manuscripts and editorial enquiries should be addressed to The Editor, *Aslib Proceedings,* Aslib, 3 Belgrave Square, London SW1X 8PL. Manuscripts should be 1,000 to 3,000 words, typewritten, double-spaced, single-sided on A4 paper. Figures should be reproducible. An abstract of up to 200 words should be included. References should follow British Standard 5605:1978. Published authors will receive twenty-five free offprints of their article.

Advertising information is available from the Editor, as above. Further information about Aslib's services and membership rates will be supplied on application to the Director, Aslib, 3 Belgrave Square, London SW1X 8PL. Telephone: 01 235 5050; telex: 23667 (answer-back Aslib London).

© 1984 Aslib and contributors ISSN 0001 253X

Information in the manufacturing industry: an assessment and proposals for improvement

George Rzevski

School of Electronic Engineering and
Computer Science,
Kingston Polytechnic

D. J. Farrar

Centre of Engineering Design,
Cranfield Institute of Technology

Paper presented at the Aslib conference 'Information for National Recovery: Needs—Resources—Technology', University of Stirling, Scotland, 13–16 September, 1983.

THIS PAPER SUPPORTS the assertion that relevant and correct information, delivered when and where required and in a suitable format, is the major asset of the manufacturing industry—the basis for competitiveness. It contains a review of the role of information in reducing uncertainties associated with decision outcomes, with particular attention paid to information required to support engineering design decisions. It provides also a brief analysis of the current state of practice in this area and proposes a way of improving the supply of information.

Information as a resource

Central to any human activity is the process of decision-making, that is, selecting an action from a set of possible actions with a view to maximising certain benefits or minimising costs.

The decision-maker is, in general, faced with a variety of possible actions and an uncertainty about the possible consequences of each action. This uncertainty may be reduced or even completely removed by obtaining the relevant information. It follows that information is a resource by means of which the uncertainty about outcomes of decisions may be reduced.

Decisions vary in importance, the importance being measured in terms of magnitudes of benefits and costs of their outcomes.

Aslib Proceedings, **36** (3) March 1984, pp. 113–117. Printed in Great Britain

For example, decisions of major importance are those concerned with the planning, design and control of very large systems (such as defence systems, satellite communication systems, transportation systems, manufacturing systems), or those concerned with the planning and design of products which are manufactured in very large quantities (such as cars, computers, aircraft).

Decisions also vary in uncertainty associated with their outcomes. The greater the uncertainty the greater is the risk of a negative outcome which the decision-maker must accept unless he or she can obtain information capable of reducing the uncertainty. And, of course, if the benefits and costs of outcomes can be expressed in monetary values there is a simple way of finding out how much it is worth paying for relevant information.

Requirements for information in the manufacturing industry

Major decisions within the manufacturing industry are those related to planning and design of products and manufacturing processes. A very large quantity of information is required by engineering decision-makers to keep the uncertainty related to outcomes of these decisions under control. The information must be:

— relevant
— accurate
— significant
— up-to-date
— in an appropriate format
— available when required
— available where required
— available at an acceptable cost

Research shows that decisions made at the design stage have the major influence upon the product success in the market place and upon product cost throughout its life cycle.

Product design controls perceived value of the product to the customer, through such aspects as performance, reliability, efficiency, ease of use, ease of maintenance, aesthetic appeal, etc. It also controls the cost of manufacturing and maintenance through the selection of materials and processes, standardisation, control of complexity, etc.

Engineering designers therefore have a major responsibility for the success of the manufacturing industry; and to carry out their tasks successfully designers must be creative, have highly developed analytical skills and be *well informed.*

Let us, as an illustration, list some of the major categories of information required by designers:

(1) customer requirements, preferences and expectations;
(2) cost and design details of important competitive products;
(3) customer opinions about their own designs and about those produced by competitors;

(4) projected volumes of sales;
(5) projected manufacturing runs and constraints imposed by available manufacturing facilities and skills;
(6) constraints imposed by maintenance processes;
(7) state-of-the-art materials, processes, methods, tools, including computer-based tools;
(8) availability of standard parts, stocked and nonstocked;
(9) relevant standards, regulations, conventions, practices, recommendations (internal, national and international);
(10) relevant patents;
(11) trends in the development of technologies, within industry and in general;
(12) political, economic, social and cultural trends which are likely to affect marketing of the product.

Current state

Research into needs and behaviour of engineering designers is rather limited. Even so, there exists considerable evidence (refs. 1, 2, and 3) that the state of affairs regarding their need for information is far from satisfactory. The following is a summary of the present situation:

(a) Design engineers, in order to design successful products and processes, need a wide variety of information. Their information needs are rather complex. Designers appear to be quite aware that these needs are largely unsatisfied (ref. 1).
(b) Many designers spend more time searching for and giving information than they do designing (ref. 2). Often up to 70% of designers' time is lost in seeking relevant information.
(c) If certain information is not conveniently available, designers tend to create a design without benefit of that information (ref. 3).
(d) Many engineering designers have no information search skills.
(c) Various computer-aided design and draughting systems contain databases with the information useful to designers and so do computer-based production and accounting systems. These various databases are not, however, interconnected; they contain data in mutually incompatible formats and most of them are not easily accessible to designers (refs. 7 and 8).
(f) Library classification and indexing systems are unsuitable for use by engineering designers. Headings of topics are arranged by scientific disciplines, which means that designers must search through vast amounts of data, most of which is irrelevant to their needs. The fact is that the requirements of engineering designers, a group of people expected to play the central role in the drive for national recovery, are largely ignored by those responsible for the organisation of library services.

The supply and use of information in the British manufacturing industry is clearly unsatisfactory. We have identified two parties that are mainly responsible for this state of affairs. They are:

— information providers
— the management of the manufacturing industry

The information providers are responsible for inadequate organisation of information required by the manufacturing industry. This information is currently scattered in a variety of catalogues, lists, brochures, books, journals, trade magazines, reports, patents, standards and computer files, which are stored in diverse places, presented in mutually incompatible formats and generally badly organised and indexed. This contrasts sharply with the situation prevailing in other advanced industrial countries, such as Germany, where there exists a large number of specialist handbooks compiled to keep engineering designers well informed and where there also exists a tradition of indexing information according to the needs of technologists, rather than, or as well as, pure scientists.

The management of manufacturing organisations is responsible on two accounts. Firstly, managers tend to neglect the design function because direct costs of design are negligible with the cost of production and the positive effects of good design (by well-informed designers) on sales and on manufacturing costs are ignored. Secondly, not many managers seem to understand the value of information as a resource and therefore are not prepared to invest in information provision.

Proposals for improvements

Before a long-term solution to the problem discussed in this paper can be proposed, it is necessary to carry out further research into the requirements of engineering designers for information and into optimal ways of supplying this information. The results of this research would provide guidance for defining the content of and developing technology for future computer-based design information systems which will integrate the collection, storage, processing, distribution and retrieval of externally and internally generated information for the manufacturing industry. These systems will, most probably, include artificial intelligence based modules capable of advising users how to search for and how to select the required information.

As a short-term solution we suggest that some resources should be devoted to the education of information providers, design managers and designers themselves in the area of supply and use of information for decision-making in the manufacturing industry.

It seems to us that there exists also considerable scope for information specialists with entrepreneurial skills to take up the role of information advisers to the manufacturing industry, helping with searching for and selecting relevant information.

REFERENCES

1. FARRAR, D. J. Product Competitiveness. *Engineer*, October 1979.
2. FARRAR, D. J. Acquiring the Skills. *CAD/CAM International*, December/January 1982.
3. BLAGDEN, J. *Do Managers Read?* CIT Press, 1980.
4. RZEVSKI, G. Improving system reliability by the elimination of a class of design errors. *In: Synthesis and Analysis Methods for Safety and Reliability Studies.* Plenum Publishing, 1980.
5. RZEVSKI, G. On the Design of a Design Methodology. *In:* JACQUES, R., POWELL, J. A. (eds). *Design: Science: Method.* IPC Business Press, 1981.
6. RZEVSKI, G., WOOLMAN, D. *and* TRAFFORD, D. T. Validation of a Design Methodology. *Design Studies*, vol. 1, no. 4,1980.
7. RZEVSKI, G. *and* PATEL, R. Research into Computer-Aided Engineering of Microprocessor and Application Systems. Proceedings of European Conference on Electronic Design Automation. IEE, 1981.
8. RZEVSKI, G. The Impact of Information Technology on Design Methods. Proceedings of Design Policy Conference. Royal College of Art, 1982.

Commercial information: packaging for innovative services and accelerated recovery

Tom Cannon

Professor of Business Studies,
University of Stirling

Paper presented at the Aslib conference 'Information for National Recovery: Needs—Resources—Technology', University of Stirling, Scotland, 13–16 September, 1983.

THIS PAPER ADOPTS a relatively broadbrush approach to an examination of the current state of commercial information and related services. An attempt will be made to integrate the analysis of public and private services while exploring the ways in which more need or requirement based initiatives are taking place within large corporations and other organisations. During this paper the impact of two parallel developments on commercial information and related services will be reviewed. These are:

(1) The technological changes in telecommunications and computer-based information.
(2) The increasing understanding at a corporate and an individual level of the need to both understand the implications of these changes while effectively managing and allocating data.

The challenge of use and application is central to the current changes in information technologies and particularly commercial information. The extent of the increase in volume, the rapid growth in access is far beyond anything conceived of to date. To illustrate, many will be aware of the rapid changes in retail information technologies. Electronic point of sale equipment, laser scanning, barcoding are being introduced throughout the retail sector. Behind these 'store level' developments equally dramatic changes are taking place at warehouse and distributor levels in retailers and wholesalers. Together these provide access to a vast amount of data hitherto unreachable. Dominic Cadbury recently pointed out:

> The introduction of scanning is estimated by the Luckys chain of stores in California to have increased the wealth of information by 2000 times and to have given them access to 20 million consumer transactions weekly.[1]

Aslib Proceedings, **36** (3), March 1984, pp. 118–125. Printed in Great Britain

The parameters of this increase are worth repeating—a 2000 fold increase in volume and access to 20 million consumer transactions per week for *one* large but not *the* largest chain of stores. The same pattern is being repeated nationally and internationally not just in retailing but in a vast assortment of the areas in which 'commercial' transactions take place: retailing, banking, hotels, restaurants, etc. A similar pattern is emerging in the public sector: transactional relationships are now far more accessible.

It has to be acknowledged that the data has always been there. However, its collection, organisation and analysis have been far too onerous to make the task worthwhile. Now this constraint is being steadily removed. Its immediate implications for those involved in commercial information gathering and distribution can be illustrated in one limited but fairly significant area: test marketing.

The test marketing of new products has been established for some time as an important part of the marketing research process but one which was generally expensive and time consuming. The data gathered was frequently imperfect, producing control costs and risks which many saw as either unjustified or only worthwhile when the high costs of new product introductions were considered. The new technologies will drastically reduce costs while providing rapid and quick access to data at a level of precision unknown today.

The same pattern of new potentials being released through ease of access and low cost can be seen in financial, legal, technological and other areas of commercial services. However, a factor which has been understated so far is the extent to which many of the new technologies may improve potentials for control by providers or intermediaries more quickly than they provide clearly identifiable benefits for consumers. The credit card illustrates this.

The potential, inherent in reading magnetic tape on credit cards, etc., has been widely discussed. In fact, the technology exists to have direct debiting from bank accounts and rapid payment to, say, retailers now. The queues at Tesco's, Sainsbury's, etc., could disappear, the delays inherent in writing cheques would go — along with the credit period built into the processing. Simultaneously the banks' ability to control the process would improve dramatically; no money — no payment, quick, simple and potentially uncomfortable. This pattern of improved potential for control will recur wherever transactions of this type emerge. Accelerated recovery of data, rapid organisation or processing, allied to speedy transmission, will provide new opportunities for commercial services based on each stage of the process. The access point, the transmission point and the processing point will emerge as the foundations of a commercial network potentially as important as the producer, wholesaler and retailer of manufactured products.

However, is it possible to arrive at any more precise picture of the configurations of services that will emerge? It is suggested here that the following characteristics will tend to predominate:

(a) *High availability:* the access points are now so diverse and interconnected that there will be high use based on constant service.

(b) *High customer specificness:* the services can and will be designed jointly by supplier and user to a degree only seen in high price, highly customised products in the past.
(c) *Recurrent adaptation:* the rate of change is now so fast that the notion of a fixed or established service will disappear.

In many senses 'availability' will pose the most immediate challenges to those involved in information management. The notion of management implies organisation and control in its broadest sense. The sheer number of access points, the expectation of access in the home as well as the office is already posing problems of systems design, especially management information systems design. Operationally the immediate problem may be information overload as those asked to use data fail to effectively handle it.

Vyssotsky[2] recently pointed out:

> Some management information systems (MIS), as well as much of the literature on MIS, rest on a significant misconception. The assumption is made that the computer systems will benefit the management of the enterprise primarily by providing more historical or projected data, of greater accuracy, in a more timely fashion, directly to the line manager for use in managing . . . [but] very few line managers want more data than they now get whether historical or projected: most managers are inundated with data.

The immediate concern to those involved with information management especially in the area of commercial services should perhaps be data reduction and associated information systems design. The key to effectiveness here may be using processing capabilities to minimise not maximise hard data access.

Simultaneously there are now a number of convergent technologies, notably computer-based distributed data processing and telecommunications which may make management of access extremely difficult.

The drastic reductions in the cost of entry level systems has made Britain the most 'computerised' society in the world. Britain has more computing power per capita than any other nation. The computing capability allied to telecommunications developments such as the move from analogue to digital transmission switching systems, such as fibre optic cable and microwave satellite links allied to the development of new transmission protocols to improve network utilisation, can profoundly change our notion of source of information.

Dr Wisse Dekker, President of Philips Industries, recently pointed out that the amount of information which can be stored on a single silicone chip has doubled, annually, for the last five years. There is no reason to assume this pace of development, with its wider implications, will slacken. Examining one of the newer technologies — computerised interactive videotext — a recent OECD Report 'Computer Technologies and Consumer Information' noted that pilot schemes in this field are currently taking place in 15 member countries of OECD (see Table 1).

TABLE 1. *Computerised interactive videotext.*

Country	*Name of System*	*No. of terminals*
Austria	Bildschirmtext	300
Canada	Telidon	4,000
Denmark	Teledata	200
Finland	Telset	260
France	Teletel	2,500
Germany	Bildschirmtext	5,000
Italy	Videotel	300
Japan	Captain	1,000
Netherlands	Viditel	2,500
Norway	Teledata	60
Spain	Videotex	750
Sweden	Data Vision	30
Switzerland	Videotex	150
United Kingdom	Prestel	12,000
United States	Various systems	n/a

The nature of this type of technology building on three already, widely available devices — the computer, the telephone and the television, will make the scope for rapid expansions of availability enormous. This development is made even more possible by the dramatic and rapid reductions in costs. In early 1982 the cheapest black and white Prestel sets in Britain sold for around £600 but mid-1982 saw a promotional price for an 'ACE-TELECOME' Prestel adaptor of £89.00.

The notion of a *library* may need to be re-thought. Two change-oriented routes may exist: their virtual disappearance as access to national or international information stores, replacing the requirement for local access; their massive expansion in focal points as 'local' distributors of networked information.

The ability to achieve high customer specificity may be the key to the latter route. The immediately preceding paper by Mr Rzevski highlighted the importance of relevant and correct information delivered when and where required to corporate competitiveness. However, a key characteristic of markets today is their increasing fragmentation with associated increases in the specialisation of firms servicing these markets. It is a pattern which can already be observed. At the same time, there is considerable evidence that more specialised concerns are more profitable than companies with diverse interests. These firms require information tailored to their specific and specialised needs. Current developments in computer technologies make this increasingly practical to achieve.

Alongside this greater specialisation of services will develop increasing customer involvement in specification and design. Providers of services have generally assumed a relatively passive client capable of limited involvement but fundamentally responding to provider initiatives. Current technological capabilities provide the scope for far greater customer involvement in specification. The distinction between provider and receiver may well disappear as their roles merge into a single function. This is likely to require suppliers/clients to become far more open in their relationship with consequent behavioural implications.

Preliminary research results suggest that the process of adoption of these new technologies is broadly following the Rodgers model of the line process of adoption as indicated in Figure 1.

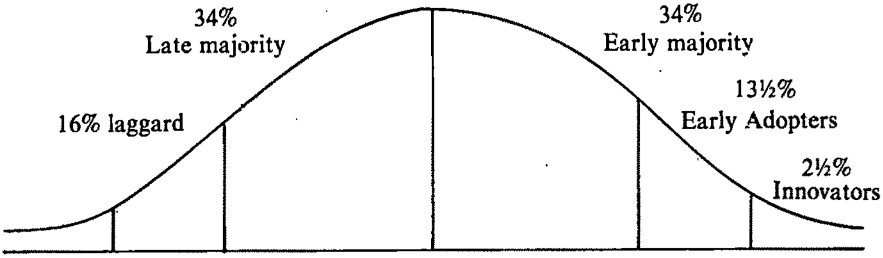


FIG 1. *The line process of adoption*[3]

In the different sectors of the market, consumer, industrial, commercial, services (public and private) this type of pattern can be seen. However, it is clear that a high degree of variation exists. This is affected by a number of factors. Techno-commercial factors, especially the need for real-line access, assisted the rapid diffusion of this type of technology in sectors such as travel agencies. Techno-cultural factors are causing resistance to the adoption among certain groups, e.g., lower, less well-educated males.

Despite these factors the face of change is remarkable. The diffusion curves for a number of media can be compared:

Newspapers:	Expansion of the market to virtually all households took almost 80 years (from 1850s to 1930s).
Films:	The same pattern of access took place over less than 40 years (from early 1900s to late 1930s).
Radio:	The expansion of the network took just under 25 years (from mid-1920s to early 1950s).
Television:	The penetration of TV took place in about 12 years (from late 1940s to early 1960s).
Electronic calculators:	The widespread adoption of these took less than 10 years (from early 1970s to late 1970s).
Home and personal computers:	It has taken less than 3 years for over 5% of all households to have a personal computer.

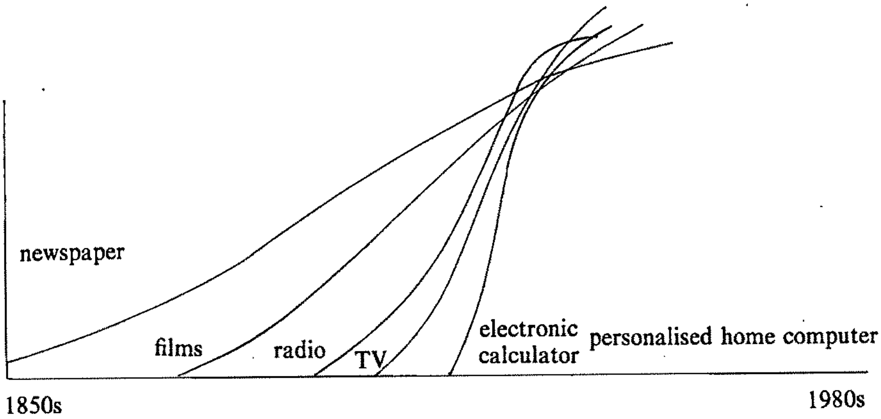


FIG 2. *Media diffusion curves*

The rate and scale of these changes will challenge many of our pre-conceived ideas.

The twin developments in customer services described above, availability and customer specificity, affect and are in-turn affected by the third factor mentioned, 'recurrent adaptation'. The rate of current change will be profoundly influenced by current developments especially those associated with the 'fifth generation' machines. These will be capable of directly supporting mathematically pure languages enhancing programming capabilities while enabling users to more easily harness machine capabilities. The entire area of expert systems development will enable those operating in specialised domains to more easily and effectively communicate with machines, hence using their processing capability more fully.

Hitherto this paper has focussed attention on the nature of the opportunities which are emerging while exploring their exploitation. It would be a mistake to assume that there are no potentially negative consequences or costs other than those indicated above. Perhaps the most fundamental change may occur in organisational relationships and structures. Traditionally these have been hierarchical and localised. That is, the overall structure of the commercial firm or public body has been based on a relatively simple internally structured hierarchy often with localised centres of knowledge and power.

This pattern may be challenged in both the short and long term. In the short term, the pace of change is likely to pose serious operational problems of adaption and absorption to hierarchically or bureaucratically structured entities. Innovation is generally achieved more easily and effectively through open organic structures. These permit information flows to be need directed rather than structure directed. A parallel pattern can be seen with task versus purpose orientated structures. The latter find change more easily than the former. Absorbing, responding to the innovations indicated above will require profound short-term organisational adaption.

The direction taken within this general phenomenon will be influenced by the nature of the technologies themselves. Researchers are only now becoming fully aware of the broader implications of the relationship between the nature of the technology and appropriate organisational structures within a wider society. The introduction of the factory system, widespread mechanisation and industrialisation were major factors in the emergence of the type of bureaucratic, hierarchical structure dominant throughout modern industrial society. This pattern of organisation extended far beyond the factory or commercial firm to a point where it is sometimes perceived as a 'natural' way of organisation.

However, modern information technologies are built around a different model. Here, networks rather than flows or hierarchy predominate. Multiple access points, vertical as well as horizontal communication, unit separation, gate keeping are replacing the single access, hierarchical structure implicit in older systems. Organisational forms will inevitably change as 'loops' replace 'lines' and 'open' rather than 'closed' systems become the norm.

The organisational changes as well as the diffusion process mentioned earlier will have a social cost, at least in the short term. D. Boddy and D. Buchanan suggest that although the direct effects on manufacturing employment have been less dramatic than earlier anticipated a number of issues need to be born in mind:

(a) Firms introducing new information technologies so far (the innovators) have tended to be the more prosperous, more successful companies. Their growth has compensated for potential job losses.

(b) The increase in turnover associated with new information technologies has been accompanied by increased added value per job, not new jobs.

(c) The greatest impact has been on older, less well-educated males, i.e., a sector which is particularly difficult to reach through retraining and other schemes.

The work of L. Sawyers in the retail sector has arrived at broadly similar findings but has noted that among female workers there is evidence of:

(i) Resistance to developing the skills to use the new technologies at a level far greater than their male counterparts.

(ii) Deskilling as first and second levels of supervisory management are reduced in operational conditions.

These broader organisational and social consequences will need to be overcome if the potentials inherent in the technologies can be realised.

Conclusion

This paper has attempted to review the range of new information technologies and services. Their diversity has been highlighted while the importance of targetting specific combinations or packages of services on the diverse customer groups involved has been emphasised. At the same time the scale and face of change has been brought out. It was noted that comparison with the diffusion of earlier 'information' technologies emphasises the increasing rate of adoption and the need to be innovatory in approaches to their dissemination.

Wider structural, organisational and individual implications have been touched upon. The challenge inherent in this was highlighted by the dilemma of the future of library services. Simultaneously it was noted that the ultimate solutions arrived at will be inextricable from the nature of the technology itself. Throughout this process of adaption to commercially induced change the wider human implications will inevitably pose problems for policy makers.

REFERENCES

1 CADBURY, D. The Impact of Technology on Marketing. *International Journal of Advertising*, vol. 2, 1983, pp. 69–72.
2 VYSSOTSKY, V. A. Computer Systems: More Evolution than Revolution. *Journal of Systems Management*, vol. 13, no. 2, 1980, pp. 21–7.
3 RODGERS, E. M. *Diffusion of Innovation.* New York: The Free Press.

Information and action in professional decision-making

Dai Hounsell

Senior Research Officer,
Institute for Research and Development
in Post-Compulsory Education,
University of Lancaster

Paper presented at the Aslib conference 'Information for National Recovery: Needs—Resources—Technology', University of Stirling, Scotland, 13–16 September, 1983.

Introduction

IN THIS PAPER I shall try to explore problems in translating information into practical action. My examples are drawn from education, but my wider concern is with the take-up of information in the professional domain. By this I mean information which is relevant to the *quality* of professional decision-making processes, and especially where those decisions affect or determine interaction with other individuals—be they clients, patients, students, fellow-professionals or employees. In an industrial context, the information would be relevant to management styles or industrial relations rather than to a new technological process. In a medical context, it would be relevant to patient-doctor relationships, but not to the nature of symptoms or the kinds of drugs to be prescribed. In education, it would concern not the content of a new examination syllabus or the applicability of a test of performance, but a teacher's curricular goals and teaching strategies.

Background

Since at least the early 1960s, it has been widely recognised that in education (as in many professions) a large and unwelcome communication gap exists between, on the one side, those engaged in research and development, and on the other, those directly concerned with the day-to-day practice of the profession. This latter group embraces educational administrators and policy-makers, and teachers in all sectors of education and training, but especially primary and secondary school teachers, for whom the gulf in communication has been felt to be at its most severe. In the late 1970s I had an opportunity to probe this gap by undertaking a study of schoolteachers' needs for information about educational research and development, of how teachers

Aslib Proceedings, **36** (3), March 1984, pp. 126–135. Printed in Great Britain

came by such information and of the use they made of it in their work.[1] Encouragingly, the findings pointed to a greater and more active use of educational information than was, I think, generally suspected. They also showed that almost all of the teachers thought that it was important to be well informed. At the same time, the findings provided strong confirmation that a gulf did in fact exist and highlighted a number of significant barriers hindering the flow of information between researchers and teachers in schools. Many of the main barriers the teachers identified are mirrored in a variety of professional fields:[2].

- Research reports are tedious to read.
- Research findings are rarely communicated to schools.
- Research jargon is difficult to understand.
- Research methods are difficult to understand.
- It is difficult to see the value of educational research to classroom teaching.

Other barriers, equally daunting as far as the teachers were concerned but perhaps not always to be found in other professional fields, were these: that as far as a majority of the teachers were concerned, there was a shortage of time, both to look for and to read educational information, and advice was felt to be lacking on where they might look for information and on what information was available.

Reviewing these and many other findings from our study, we concluded that no single measure would make great inroads on the communication gap. What was required, we argued, was a set of strategies and policies designed to tackle the problem at a variety of levels: 'the presentation of findings, their communication through several different channels, methods of extrapolating their implications for practice in particular settings, the training of teachers in the nature and problems of research and in available information sources and their use, access both to bibliographical services and to the literature of education, and the development of information services designed specifically for teachers'.[3]

Three years after the publication of our report, it is worthwhile to return to this formidable array of recommendations and ask: if all these measures had been implemented, would the much-lamented gap have dissolved, or at least been minimised? With the disarming benefits of hindsight, my answer today would be that while the gap might have been greatly narrowed by the package of measures we proposed, I am not at all sure that it would have been bridged. And in order to explain the reasons for my current uncertainty, I must move the focus of discussion into another sphere—that of the emergence of the workshop as a tool for professional development. I want first to try and define what a workshop is, and then to highlight aspects of the workshop approach to professional development which seem to raise questions about the interrelation of information and action.

Throughout my discussion of the workshop, I shall be unable to disguise my firm adherence to workshops as a fruitful approach to professional development. I should therefore stress that my purpose is not to praise workshops, but to explore the problems they pose for information use. And as I should also stress, workshops are a means of *tackling* these problems but do not necessarily resolve them. Genuine success (assuming we could find a valid way of ascertaining it) is a slippery eel, more likely than not to elude our grasp.

The Workshop

The traditional approach to professional development has followed what is sometimes called the 'top-down' model. A key assumption is that, since there exists an abundance of published research findings which have implications for professional practice, the most appropriate model of course design is one in which these findings are directly disseminated to practitioners. Thus, in a typical development activity, an invited expert, knowledgeable about findings on a particular topic, would present a personal synthesis of what research seemed to show. There would often be supporting materials such as potted bibliographies or digests of findings, on the assumption that there would be selective subsequent follow-up through private study and reading. In this model, then, a corpus of research findings determines the pool of observations from which the invited expert or the compiler of the brief bibliography would draw. Practitioners are brought up-to-date with current findings and there is often an opportunity to conclude with a brief discussion of implications for practice.

The workshop approach is altogether different. The emphasis shifts away from the expert contributor and what he or she has to convey. Information derived from research findings has a less prominent and less direct role, since the main focus is not on the literature about practice but on practice itself. The aim is to clarify and explore the premises and principles which underlie customary ways in which professionals tackle problems. In the workshop model, then, the deployment of research findings is selective and optional rather than mandatory, and it is problem-centred rather than topic-centred: the research literature is used not simply 'because it is there', but because it is perceived to have a valid contribution to make to the understanding of problems and their resolution. And since the aim in a workshop is to create a situation in which those taking part can actively reflect on facets of professional practice, those who would comprise the 'audience' in the traditional approach become instead participants in the workshop model.

In analysing our own experience in a project concerned with encouraging the development of the teaching of information skills in secondary schools,[4] I tried to summarise the most important characteristics of a workshop under four headings: the mode of learning, the 'curriculum', the structuring of activities, and the role of the workshop leader.

Mode of learning

Above all a workshop provides an active mode of learning in contrast to the passive mode which characterises the lecture, the talk and similar situations where the flow of information and ideas tends to be in one direction only, from speaker to audience. Participants continually contribute actively by working on problems or advancing ideas. Where they are cast in the role of listener, this is as part of the give-and-take of open discussion: no single individual assumes more than temporarily the mantle of 'contributor' or 'speaker'.

Curriculum

A workshop makes use of materials which have been designed in advance but familiarisation with or use of these is not an end in itself. It is the means through which participants articulate and share experiences and problems. In that sense, a workshop has no predetermined subject-matter in the form of a body of knowledge which participants are expected to have acquired as a result of taking part. What participants learn is geared to their own professional situation and will emerge during the course of the workshop. It will be different for different individuals in the light of their own needs and experiences. A workshop has a curriculum, but it resides in the aims and structures of the workshop.

Structure

This might suggest that a workshop does not require the same level of preparation as does, for example, a series of talks. Yet if anything a workshop requires a greater degree of planning than the latter. An atmosphere which will foster active engagement does not emerge of itself: it has to be striven for. Similarly, individuals often have little experience of working collaboratively in groups. Structures must therefore be sought which offer a secure framework within which individuals and groups can work purposefully without sacrificing their sense of autonomy or losing opportunities to make initiatives of their own.

Role of workshop leaders

It follows that the role of those who direct the workshop is not primarily that of transmitting subject-matter. Their role is to plan on the lines indicated above and, within the workshop itself, to act as facilitators, prepared to help participants to overcome problems, to maintain momentum, and to initiate new activities where this seems fruitful.

An example of a workshop; drawn from our work on information skills, may help to make this more concrete.

The workshop was designed to stimulate reflection amongst teachers, librarians and local education authority advisors about the information skills aspects of the secondary-school curriculum, and to explore ways in which these skills might be more systematically fostered in day-to-day classroom learning. The main materials used in the workshop consisted of a set of nine questions which pupils can ask themselves as they go through the steps of an assignment (such as an essay or project) which involves finding and using information. These steps (see Figure 1) are taken from a monograph prepared by a joint British Library Research and Development Department/School Council working party.[5]

1. WHAT DO I NEED TO DO?
   (formulating and analysing need)
2. WHERE COULD I GO?
   (identifying and appraising likely sources)
3. HOW DO I GET TO THE INFORMATION?
   (tracing and locating individual resources)
4. WHICH RESOURCES SHALL I USE?
   (examining, selecting and rejecting individual resources)
5. HOW SHALL I USE THE RESOURCES?
   (interrogating resources)
6. WHAT SHOULD I MAKE A RECORD OF?
   (recording and storing information)
7. HAVE I GOT THE INFORMATION I NEED?
   (interpreting, analysing, synthesing, evaluating)
8. HOW SHOULD I PRESENT IT?
   (presenting, communicating, shaping)
9. WHAT HAVE I ACHIEVED?
   (evaluating)

FIG 1. *The Information Skills Curriculum*

At the start of the workshop, the participants were asked to recall and jot down notes on a recent assignment which they had set their pupils or in which they had been involved (e.g. as school librarian). Once they had done this, they were given a handout listing the nine question steps. They were asked to put themselves in the shoes of a pupil doing the assignment and to try to answer each of the questions which that assignment posed. The assignments and the responses to the questions were then progressively discussed, first in pairs and then in groups of four. Each group of four next chose one of their four assignments for closer study, and were asked to venture further by examining three additional questions:

1. What skills do you assume the pupils will already have mastered *before* they embark on the assignment?
2. What skills do you hope pupils will acquire or develop in the course of doing the assignment?
3. In the light of 1 and 2, what difficulties do you think the pupils will encounter in tackling the assignment?

Finally, each group of four participants prepares a poster summarising the assignment and their analysis of it. These posters are displayed to all of the groups and form the basis for a general discussion. This workshop can then be followed up by linked workshops in which programmes of action are devised and lesson plans prepared.

I have used this particular workshop as an example of the more general characteristics I outlined earlier. It illustrates an active mode of learning, a curriculum where the subject-matter is steeped in participants' own practices, and a structured set of activities; and it suggests (though does not illustrate directly) the distinctive role of the workshop leader. I want now to pursue this example a little further. I said earlier that a workshop offered a means of at least confronting some of the stubborn problems of implementation, even if it did not necessarily succeed in surmounting these. Two issues or groups of problems arising in and highlighted by the workshops we mounted were those of *context* and *experience*. These issues of context and experience are especially relevant to my broader theme of the relations between information and action, and they are not exclusive to education. Workshops have emerged as a potent tool of professional development, not only in education (which, I think it would be fair to say, joined rather than led the bandwaggon) but in management and many other professional spheres.

Context

A profession is not practised or pursued *in vacuo*, but within a specific context or setting. And whether this setting is institutional, industrial or commercial, it invests everyday professional practice with a distinctive character. In any given company, partnership, organisation or educational institution there will be a particular style of management or leadership governing the relationships between employees and determining the processes of decision-making: a particular set of aims and goals, underpinned by specific bodies of assumptions and values; and a pattern of assigned commitments, responsibilities, and financial allocations.

Under some circumstances this context may help to facilitate change, but it is much more likely to constitute a web of obstacles which hinder change by in effect imposing constraints on what might be attempted. An initiative prompted by new and challenging information from the research literature may run counter to prevailing assumptions and values, require an unwelcome redeployment of responsibilities or finance, or stem from an enthusiastic junior member of staff who is isolated from the arenas of decision-making where approval to go ahead must be sought. To return to my information skills example, it may not be too difficult to convince a teacher or librarian that the skills of finding and making use of information are crucial ones which *ought* to be more systematically fostered, whether because of their relevance to learning within schools or because of their more general importance beyond school, in our everyday lives. Yet to go beyond this act of acknowledgement and take concrete steps towards curriculum implementation is to grapple with a perplexing host of difficulties. Some of these difficulties are easy to identify though far from easily overcome. A teacher's responsibilities may be such that there is little time left over for the reflection, planning, design of lessons and materials and so on which a positive step forward would entail. And assuming that additional time can somehow be found, there will still be hard battles to be fought if timetable slots are to be allocated and the all-pervasive demands of the examination syllabus are not to be seen as at risk. Other difficulties of a less obvious kind may prove equally obdurate. If the established pattern of decision-making means that the teacher must first gain the approval of senior staff, there may be the problem of combatting deeply entrenched attitudes which give pride of place to the coverage and mastery of subject-matter and underrate skills and processes of learning. Or, to take another example, the hard-pressed school librarian may be in a situation in which the only way forward is to *make* time for new initiatives by reappraising priorities. Looking at this situation as an outsider, I sometimes observed in the course of our workshop discussions that the overwhelming priority given by some school librarians to high-precision classification and cataloguing was perhaps ripe for re-examination: was it right to put a premium on an immaculately catalogued stock of books if the librarian also felt that the school library was sadly underutilised or that pupils needed more systematic training in information skills? Understandably, librarians were loath to contemplate a reappraisal of this kind, even if it did offer a way forward, for it challenged a tradition of meticulous custodianship which had become deeply embedded within the professional ethos.

The professional context, then, is the most demanding of obstacle-courses. Any new initiative, however rational or well informed it might appear, must run a gauntlet of resource constraints, established procedures and ingrained attitudes and values. The route from information to action is tangled and uncertain of success.

Experience

A workshop may help to cast light on contextual barriers because part of its focus can be *prospective*, i.e. towards the possibilities of implementation within a specific setting. But the focus of a workshop is also in an important way *retrospective*: it looks backwards, as it were, to the body of professional experience which participants have accumulated, and thus might bring to bear on the examination of problems. This examination may be helped if use can be made of information which can be directly linked to experience. The survey I described earlier, for example, showed that teachers were more likely to find information useful if it was localised or personalised—i.e. if it was rooted in the experiences of particular teachers or particular schools. Nonetheless, the issue of experience goes beyond the question of the form in which information appears in the published literature.

It tends to be taken for granted that where an individual has a large body of professional experience, that experience is immediately accessible and can be applied to a problem. Where the problem involves coming to terms with new information of potential relevance to practice, then, experience is seen as a powerful resource for scrutinising and weighing the new information and its practical implications. This is viewed as giving the established professional a clear edge over the novice.

It is misleading, however, to see experience as necessarily and inevitably a ready resource, easily wheeled into action. As Argyris' work has shown,[6] the actions of professionals are governed by their *theories-in-use*: broadly speaking, by the knowledge they have acquired, through experience, of how to act in given situations in order to achieve desired outcomes. These theories-in-use, however, are frequently incompatible with their *espoused theories*—that is, with the theories of action which they claim allegiance to and which they profess when asked how they might behave. Moreover, theories-in-use are tacit and implicit: we cannot ascertain them simply by asking someone directly.

To put this in a more general way, under the everyday pressures of professional life, experience is accumulated but seldom inspected. Although an individual's professional experience may be made up of a myriad of particularised reflections, tried and tested intuitions, and seasoned know-how, it is not something which can easily be called up and issued on general request, for it is locked into the individual's acquaintance with specific situations and circumstances. If however individuals start from a familiar professional situation of their own choosing, there is then a focus through which to clarify their experience and thus to articulate it, by attempting to make it explicit. Articulating experience is also helped if there is an opportunity to share it with others examining the same or a similar professional situation. By sharing similar experiences, parallels and contrasts can be drawn which may shed further light.

My earlier workshop example illustrates this issue, if only in an elementary way. If (as has often been the case) I am asked to give a *talk* rather than a workshop on the importance of information skills teaching, the reactions of the audience follow a fairly stable pattern. Some of the teachers present find the notion of information skills interesting but feel that these skills play no part in their own specialist subjects. Some teachers see a link with their own subject, but in a general rather than a specific way: information skills are recognised as clearly relevant to the subject, but what precise forms these skills might take in the subject has yet to be clarified. Others (usually the smallest group) see direct and specific links with their own teaching, although they may be uncertain about how to enlarge their understanding of these links.

If, however, I mount the workshop I have described, the sequence followed is the reverse of that adopted in the talk. Instead of being presented with new information (the notion of information skills) and being left to consider its relevance to their own teaching experience, the workshop participants are invited to start by recalling a potentially relevant experience (an everyday assignment) and then to look for aspects of it which might demand skills in finding and looking for information. In other words, in the workshop approach, the teachers have an opportunity to articulate potentially relevant experience, and so render it more readily accessible. The new information with which they are presented (the notion of information skills) can be tested against a concrete instance of their own professional work, rather than considered in a non-specific and thus more abstract way.

And the consequences of mounting a workshop rather than giving a talk are almost invariably that at the end of workshop it is hard to find a single teacher who cannot both acknowledge that information skills play some part, however modest, in his or her subject and make an interconnection between the skills and a concrete teaching instance taken from personal experience.

But here again, the impact of a workshop must not be overstated. It does not unlock an entire complement of relevant experience, but can be a small step towards making some fraction of that complement more explicit and accessible. In the case of information skills, for example, there remains a great deal of experience still to be articulated and deployed in considering what might be done to promote these skills more deliberately. And the more general implication to be drawn is that while experience may be a potential resource in exploring new information, its potential has to be actualised. Its deployment cannot be taken for granted.

Conclusion

This paper has explored aspects of the interconnections between information and action in the realm of the professions, concentrating especially on the problematic issues of the readiness with which experience can be deployed in the service of information use, and the context within which new information might be acted upon. As I have tried to show, both issues draw attention to the daunting problems of the take-up of information—problems which in my view have received much less attention than they deserve.

This of course prompts a major question. As far as professional information at least is concerned, is the take-up and adoption of information at the centre of the concerns of information science and librarianship, or at the margins, and therefore the chief responsibility of others? The dazzling revolution in information technology ought to provoke more rather than less vigorous scrutiny of this question, since there seems to be a great danger of a bottleneck arising from an imbalance between a highly sophisticated technology expertise in storing and retrieving information and a still nascent capacity to marry information to practical action. Information cannot play a prominent part in national recovery if it is amply available but thinly utilised.

ACKNOWLEDGEMENTS

The author wishes to acknowledge the generosity of the British Library Research and Development Department, which funded the two projects described. The views presented in this paper, however, are those of the author and not necessarily those of the British Library.

REFERENCES

1. HOUNSELL, D., *et al. Educational Information and the Teachers.* (BLRDD Report No. 5505). London: The British Library, 1980.

2. Some of these findings are for example mirrored in LYNAM, P., SLATER, M. *and* WALKER, R. *Research and the Practitioner. Dissemination of research results within the library-information profession.* (Aslib Occ. Publ. No. 27). London: Aslib, 1982.
3. HOUNSELL, D. *et al. Educational Information and the Teacher,* p. 72.
4. HOUNSELL, D. *and* MARTIN, E. *Developing Information Skills in Secondary Schools. A dissemination project.* (Library and Information Research Reports, No. 9). London: The British Library, 1983.
5. MARLAND, M. *et al. Information Skills in the Secondary Curriculum.* (Schools Council Curriculum Bulletins, No. 9). London: Methuen, 1981. Appendix C (pp. 51–9) of this booklet is a step-by-step discussion of the design and mounting of the workshop described in this paper. The Appendix has since been reprinted in HOUNSELL, D. *and* MARTIN, E. *Developing Information Skills in Secondary Schools,* pp. 80–9.
6. ARGYRIS, C. *and* SCHÖN, D. *Theory in Practice: increasing Professional Effectiveness.* San Fransisco: Jossey-Bass, 1974.

Information in national planning—a developing role

Norman Higham
University of Bristol

Paper presented at the Aslib conference 'Information for National Recovery: Needs—Resources—Technology', University of Stirling, Scotland, 13–16 September, 1983.

IT IS APPROPRIATE in this setting to remember the story of the Scottish Minister chastising his flock for their multitudinous sins, and threatening them with hell-fire and damnation on the Day of Judgement. 'Ye'll cry out then to the Almighty "Lord, Lord, we didna ken!" and the Lord in his Infinite Mercy will look down on ye and say "Aye well, ye ken the noo!"' Lack of information can have serious consequences. Ignorance of the law is no defence in court. And a recent series of advertisements for *The Times* offered graphic examples of the consequences of not being better informed. Everyone agrees that being better informed is a good thing, everyone wants information but not everyone is prepared for significant resources to be spent on it. But no advances can be made except on a basis of a considerable body of information. All actions are based on information. The experienced person is calling on his own mental information store a million times a day. It is interesting to speculate to what extent he *selectively* recalls information, to what extent one part of his brain acts as 'information intermediary', filtering information and rejecting 'noise', an aspect of information work arousing considerable interest today.

It is clear that planning, at whatever level, requires the exercise of imagination; it is a creative act in which an intuitive leap will be as important as the construction of steps. But it cannot take place except on the basis of information. In some areas of activity the amount of information available may be small, and we shall need it all. Where the information is plentiful we shall select. It will not all be contained in factual reports, it may not all appear to be directly relevant, but the enquiring and the creative mind, tuned to receiving all that can be used, will see the relevance. An obvious case is the story of Fleming's work on penicillin, based on his observation of the clean spot on the dirty watch-glass. There are other cases among the I. K. Brunel collection in my library, where visiting civil engineers are baffled that Brunel could have made such assumptions concerning bridge stresses and spans, since knowledge, on which the assumptions should be based, was not

Aslib Proceedings, **36** (3), March 1984, pp. 136–143. Printed in Great Britain

then available. One answer could be that Brunel took unwarranted risks, as was sometimes thought at the time, when engineers waited beside the newly-constructed Maidenhead Railway Bridge expecting it to fall when the wooden formers were removed (it did not fall, and has not to this day, although Brunel 'could not have known'). The real answer, authenticated by time, is that Brunel had enough information which, manipulated uniquely by a particular genius, provided the basis for sound judgements for planning purposes; so we must remember that there is occasionally something which must be called information, which cannot be universally or even widely available, because it is assembled out of disparate sense perceptions and may be uncommunicable, while clearly serving as information for the individual.

The fact that individual actions and decisions may take place on the basis of discrete information, puts a greater premium on the maximum availability of information which *is* communicable. This is more than ever true at a national level where problems have reached a complexity greater than ever before, with more people than ever involved in national decision-making. The interrelationships among various departments of government, once considered irrelevant to each other, require the ability to shunt information rapidly among departments. (Also required among departments is not merely the will to give information, but also the will to *want* information, to be receptive.)

Decision-making at most levels, and especially at the national level, takes place in an uncertain environment. We now drive for miles in contra-flow systems on motorways designed at a time when it was believed that the railways would carry much of the freight now hammering along the slow and fast lanes. The designers did not have information about the future. They presumably had, or were able to obtain, information about the past, about the consistent underestimating of traffic density by previous planners, information about the previous attitudes of rail unions to certain practices concerning freight movements. Perhaps on the basis of such information they constructed motorways somewhat stronger than appeared necessary at the time; or perhaps they did not. If they did it was not enough. Since the designers 'could not have foreseen' the road freight traffic level, the waste of resources on premature motorway reconstruction was 'inevitable'; perhaps that is the only sensible way of seeing this particular incident. What must be the concern of planners, and therefore of those who supply the planners with information, is to bring together all information which may throw light on a problem and anticipate difficulties. The decision as to how wide-ranging the information-gathering must be, into what areas of apparently irrelevant information the search must go, is likely to be largely intuitive or imaginative. And this highlights the point that information searching is a creative activity, is proactive as well as, or more than, reactive. This is one reason why academic scientists are tempted to carry out their own manual searches, and to be present, to participate, when computer-based searches are carried out. They are concerned that a more generalist information officer may miss a 'signpost' that they might recognise. Only Fleming, armed with his internal information store and his 'antennae waving', was able to make the imaginative leap from observation to proposition.

It is too much to hope for a national economic breakthrough by these means—the discovery of political penicillin (though some would say it has already been discovered and is being administered in large doses). But the work of information gathering, on demand and in anticipation of demand, and its selection and presentation, are activities, and I stress again, creative activities, comparable in importance with the decision-making and the actions which they must precede. José Ortega y Gasset in his essay, 'The Mission of the Librarian', written in 1935, when the multiplicity of books appeared to him the serious problem that information presents today, saw the librarian of the future 'as a filter interposed between man and the torrent of books'. Filtering, selection for use, is a vital element of the vital work of information storage and retrieval. And this means that over and above the machines that crunch numbers and sort and display, must stand intellects.

The intellects that are available for the creative work of information handling are scattered throughout the country in libraries, information centres, research organisations, companies, record offices, government establishments, all serving themselves, their employers, their clients, their public. The resources, bookstocks, databanks, systems, bibliographies, which they assemble for their own patrons could be of use to other groups, and could avoid areas of waste, incurred not only in re-inventing the wheel but in putting the cart before the horse. The co-operation that is here implied has gone on for a considerable time. At the first meeting of the Library Association in 1877, co-operative projects were discussed, and not as if they were a new phenomenon. The clearest example of long standing co-operation at a national level is interlibrary lending, which received its greatest impetus among public libraries from the Kenyon Report of 1927, which recommended the setting up of what became regional library systems liaising with the National Central Library, and among academic libraries from the recommendations of the Association of University Teachers about the same time. At a local level the development of interchange organisations among industrial libraries, with the local public library as honest broker, followed during the 1930s. It was at an Aslib conference in 1932 that J. P. Lamb, City Librarian of Sheffield, put forward the idea:

> Although a wide range of technical journals is stocked in our Commercial and Technical Department, it is astonishing how many ... requests have to be met by loan through the NCL. This leads to an interesting suggestion. Most works libraries carry a fairly extensive selection of technical journals dealing with their products and methods, many of them of a very specialized type. There would be obvious advantages in a pooling of these periodicals with the Public Library as a medium of exchange.

Out of this idea was formed SINTO, the Sheffield Interchange Organisation based on Sheffield City Library.

We have not been short of co-operative schemes, formal and informal, local, regional and national. Such schemes have not however been coordinated at a national level. They grew up independently to meet perceived needs, and there was nobody within the library or information community to consider whether a more organised structure of co-operation was necessary or desirable.

In 1967, the University Grants Committee Report on University Libraries, the Parry Report, which scrutinised in considerable detail the organisation and services of university libraries and made numerous useful recommendations for the improvement of and the improved provision for university libraries, also looked at the national scene. It recommended that the various library departments at the British Museum should become the British National Library, with responsibility for union catalogue maintenance, interlending, coverage of foreign material, central provision, research, training and co-ordination of library services. This recommendation was taken up by the government of the day, which set up the National Libraries Committee under Dr (now Sir Frederick) Dainton. In 1969 the Dainton Committee reported and its major recommendation was the setting up of a National Libraries Authority. In 1971 the Government announced its intention to set up a national library and in 1973 the British Library was formed. It is significant that Parry recommended a British Library Services Council, and Dainton, agreeing with Parry on the lack of a co-ordinating body, recommended a National Library Authority. What was created was only a part of the proposed body, a large and crucially important part, described to you by Sir Harry Hookway at your Edinburgh Conference in 1978. What was not set up was the Services Council part, the Authority part, in other words the national co-ordinating body.

In 1974 on the initiative of Kenneth Humphreys, the Standing Conference of National and University Libraries (SCONUL) took up the argument for a national co-ordinating body. It quoted the Dainton Report 'the lack of a national policy . . . has prevented the nation's library services from developing in accordance with a coherent and comprehensively considered plan.'

The Library Association also took up the case and both bodies were able to present their arguments to a Select Committee of the House of Commons in 1978. The Committee recommended that the Department of Education and Science should set up a Committee to examine the relationship between the Department and the library and information services. Within DES was the Office of Arts and Libraries, and serviced by OAL was the Library Advisory Council (England), whose function was to advise the Minister for the Arts on matters concerned with libraries. Was this not a suitable body to co-ordinate services, to ensure national planning? SCONUL had not thought so in 1974, the Library Association did not think so, and the Council itself did not see this as its function. Though its brief was not so narrow, it was in practice concerned only with public libraries, in connection with which the Minister was responsible for ensuring an adequate level of service. The Office of Arts and Libraries was aware of the thinking within the library community and had proposed to the LAC that a report be produced on the future development of libraries. A working party was set up and reported in 1979. Alongside recommendations that DES should play a more active part in discussions on library services, was a proposal that LAC itself should extend its membership, broaden its representation, and concern itself with the wide range of library services in the country as a whole. The working party was clearly envisaging LAC as potentially the national co-ordinating body which the library community was seeking. SCONUL's reasons for rejecting the idea of LAC as such a body were, firstly that it was empowered only to deal with England, and secondly, that what was known of its activities in previous years did not offer an assurance that it was equipped for such an imaginative, wide-ranging and responsible role.

However, recent events had stirred enthusiasm in the Office and a second working party was set up with the task of considering libraries and information services of all kinds, of examining the scope for improving and supporting the library and information network and for optimising availability of resources. This was more like a real move towards national planning. Its report 'Working together within a national framework' was a clear call for national co-ordination and a bid to undertake the task. A new atmosphere had permeated the Council, and those aware of it were not surprised that (1) a new title was found for the body, the Library and Information Services Council, (2) a Chairman was appointed who was an experienced qualified librarian and library educator, and (3) a greatly increased workload was taken on by the 'new' and more representative body.

The Minister for the Arts has charged the Office of Arts and Libraries with the central responsibility for co-ordination. The United Kingdom dimension has been brought in by means of discussions with the equivalent bodies in Northern Ireland, Scotland and Wales, and a special adviser to the Minister on information matters, John Gray, has been appointed. In a typically British way, through committees, reports, chance encounters and occasional directives, something with the potential to act as a national co-ordinating body has emerged. It lacks the power to act at a United Kingdom level, it lacks teeth and it most regrettably lacks money.

What do we hope for from the reclothed and toughened body? Who needs it? In the absence of anything better, the country needs it, or needs what we hope it can do, what we had better be pressing for it to do. If information is a basic necessity for national planning, then national planning for information must be undertaken to ensure its most efficient provision. This is particularly important at a time of serious financial constraint, when many related services are being independently, and in some cases, arbitrarily, cut. But it cannot be emphasised too strongly that national information planning should not be used simply as a means of doing things on the cheap. Streamlined, yes; cheapjack, no. The second report of LISC 'Working together', referred to the need to move more purposefully towards a mainly access philosophy and away from a holdings philosophy. While it is obvious that some libraries cannot adopt a mainly access approach unless there are others with the holdings, the guiding principle here is based on the fact that given the continuing expansion of information, individual libraries cannot hope to be comprehensive repositories. This, rather than the short-term and short-sighted concern of financial constraints, is behind the access principle; this and the view that our job is to make materials and information available to our users in the most efficient way possible. In so far as information can be made freely available, it should be seen as a national pool to which we all contribute and from which we can all draw. A national plan can reveal gaps in provision as well as any unnecessary duplication. Leaving aside confidential information, what we hold or can create we are surely prepared to share for the national good. Or are we? Are we prepared to do so if it means depriving our own users, if it means using staff time and resources which are in short supply and hardly adequate for the needs of our own institution? If I say no, I am, according to one commentator, displaying the 'primary client syndrome', what I would rather call 'knowing where my duty lies'.

As far as I am concerned my first concern must be to my institution; contribution to the pool therefore must be assisted in some way that ensures already existing systems are not made worse by dissipation of energies. One way of providing this assistance, the simplest way, is a financial one. Let us be encouraged to co-operate beyond our present capabilities by the carrot of payment, administered in some agreed practical manner. The present LISC does not have the power, or the funds, to do that and neither does OAL. All they can do is to seek out ways of more efficient co-operative provision and encourage them. If we cannot afford to adopt them, then they either founder or enabling money will have to be provided. This unco-operative attitude is inevitable when our individual services are under such considerable strain. We tell our own authorities that we cannot take further cuts without services suffering, and we cannot take on extra services without additional resources; we cannot therefore tell a national body otherwise. Nothing is for nothing; which appropriately introduces remarks on the private sector, or which is not quite the same thing, the non-public sector.

So far, though I have studiously avoided any such bias, my remarks have probably been taken to refer to the publicly-funded sectors, a criticism that has been also levelled at the LISC reports. This is a good occasion to discuss the contribution to national resources by industrial libraries, learned society librarians, information consultants, etc. It is often brought firmly home to me that, in my job as a University Librarian, I lack the beneficial discipline of what you call a 'bottom line'. I used to call it the 'profitability motive' until I saw the hurt look on the faces of industrial librarians. A bottom line gives you a better opportunity for performance measurement, or so the theory goes, and a bottom line certainly makes identification of objectives a simpler operation. The problem for the private sector in our information network is not merely the same one I have, that is, time is money, but also, since information is power and increased competitiveness, it cannot be passed on without a serious effect on that bottom line.

One question to be asked is how deep-rooted is this problem? What proportion of your rich fund of information is vital to your commercial health only so long as you hang on to it? If not information, is your expertise for sale to the national pool? These are very serious questions which affect national survival as well as individual company survival. A strong industrial and commercial base is essential to a healthy national economy, to the economic well-being of the country.

It is inevitable, at a time when cost-effectiveness is all, that 'the economic well-being of the country' rings in one's ears and echoes in one's arguments. I think it was Harry S. Truman who admitted that he was grown up before he came to learn that 'goddam British' was not one word. Youngsters in Britain may be in the same position about 'economic well-being'. National well-being involves more than 'the country paying its way', and most people will agree when pressed that there are moral, cultural and spiritual dimensions to be taken into account. National planning should include creating the opportunities, on the one hand to ensure that all information needed by the people is available, and on the other hand to enable them to be 'more informed persons' in a more-than-factual sense. This does not affect merely the traditional role of public and academic libraries, but includes the private sector too, whether in receipt of government subsidy or not. The entertainment industry is in a position to contribute to our personal and therefore national well-being. The development of cable television, the growth of the video industry, the development of information technology and advance into the domestic scene influence people, influence society in general and the well-being of the nation. It is not merely social do-goodery that prompts us to look to national planning in these areas. The way that new technologies develop will affect us all, and the coming generations more so, as persons, as professionals, as managers, as entrepreneurs. What sort of people we become in the next century through our cultural and social environment will not merely be interesting in itself—it will affect how we arrange our national affairs, how we react internationally. It will affect how good we are at achieving economic well-being, a matter no doubt still of interest in the twenty-first century.

Returning to the main theme, national planning for improved information facilities for more efficient national planning; planning does not necessarily involve directing the components to do this or that. In such a wide-ranging field as library and information services it could not be done even if desirable. What is needed is the creation of an environment in which the sharing of information and expertise is seen to be logical and mutually useful; the encouragement towards, and illustrations of the benefits of, local, regional and national co-operation among different organisations, and the provision of funds, whether as pump-priming grants or as subsidies, to provide practical stimulus. The commentator whom I quoted anonymously earlier in this paper is Don Kennington of Capital Planning Information, who has completed a most important report for the British Library on the economics of local co-operation, soon to be published by CPI. On the basis of a carefully constructed and conducted survey he established attitudes to local co-operation by both the enthusiastic and the sceptical. He did not find librarians to be instinctive co-operators, as I would have liked to believe. Financial constraints, the 'primary client syndrome', and resistance by line management to the Chief's greater tendency to join in ('He doesn't have to carry it out') are indicated as factors militating against success. He argues for more research, and this is sensible; we need to investigate the obstacles more thoroughly. I incline still to the view that the greatest obstacle is financial. If it is in the national interest to make more efficient use of the country's resources of information and information gathering expertise, it is worth investing in it. The 'vested interests' Don Kennington found are likely to be loyal servants of their employers; the resistant line managers are probably working as hard as is reasonable, maintaining internal services. Liberate them all from feeling they must add grudging extra mural work to hand-to-mouth basic service provision, by commissioning co-operation, and the expenditure will be repaid. Co-operation for national benefits should be co-ordinated with rewards, not demanded with exhortations. The information scene is growing and, to my untutored eye, getting more not less fragmented. It cannot be in our individual interests to see this picture harden; it is surely not in the national interest that information should remain difficult of access to the many business, public and individual interests who need it. Not scarce but difficult of access! Yes, of course we all agree; but are we going to will the means to improve the situation? The industrial sector has clout and it has the ear of some departments of government. Let us hammer out, we who really do have much in common, a joint approach to persuade the will of the people that investment in the organisation of information and the co-ordination of information provision is the bargain of the decade. There is little time before damage is done. As Deborah Harry sang: 'It's 11.59 and I want to stay alive'.

Updating managers—assessing the case for a radical approach to retraining

Rowena Mills
Rowena Mills Associates

Paper presented at the Aslib conference 'Information for National Recovery: Needs—Resources—Technology', University of Stirling, Scotland, 13–16 September, 1983.

AS YOU WILL appreciate, I am speaking to you as an industrialist, that is, as a user of information.

My emphasis will thus be upon the need for managers, both inside and out of industry to be thoroughly aware of industry's information requirements. I hope, therefore, that it will be helpful to you if I devote some relatively large part of this paper to demonstrating in practical terms just how detailed and wide in scope are those requirements.

As a nation we, in the UK, have suffered far more severely in the world recession than the bulk of industrialised countries, and certainly more severely than our immediate competitors. Thus, between 1979 and 1982 the level of industrial production as a whole in the UK fell by 10%, that of both West Germany and Belgium fell by 4%, France by 2½%, while that of Japan actually rose by as much as 6%. Much of the fall in industrial output as a whole in the UK was cushioned by North Sea Oil output, and if we take manufacturing industry alone, between 1979 and 1982, a dramatic decline of 15% is recorded!

The reasons for this unwelcome performance were twofold.

In the first place the record high level of Minimum Lending Rate imposed by the new Conservative Administration in November 1979 resulted in a rapid destocking movement from the retailer right back along the chain to the manufacturer, demand for whose products then fell rapidly away. At the same time the high level of MLR resulted in sterling appreciating to a totally unrealistic level. This resulted in our products becoming less competitive in overseas markets, and opened our gates to a flood of lower-priced imports.

However, during the recession the level of retail sales continued to rise; sadly, however, this increase in demand was met almost entirely by those competitively priced imports.

Far more important for the long term well-being of the UK economy is the second reason for our comparatively extremely poor performance over the 1980s to date.

Aslib Proceedings, **36** (3), March 1984, pp. 144–153. Printed in Great Britain

We have suffered the penalty of years and years of declining competitiveness, and the factors above only served to aggrevate, not create, the reduced level of industrial demand.

This lack of competitiveness has shown itself in several ways—in relatively high unit costs; in poor workmanship; in poor after-sales service and delivery; in lack of appropriate investment; in lack of salesmanship, and, above all, I believe, in lack of marketing expertise.

A great deal of this can be laid at the door of the failure of our managers to forecast the decline of the old traditional type of industry upon which the UK economy had so long been based, or to be aware of the arrival of the new, technologically oriented industry, bringing with it the essential training of those managers in a whole new range of knowledge, including the use of information, technology and computerisation generally.

It would seem therefore that the title under which you have asked me to speak—'Updating managers: assessing the case for a radical approach to retraining', is most apposite. It is also most timely when we, as an industrialised nation, will undoubtedly continue to experience intense competition, faced as we will be with a new low-growth scenario, still unfamiliar to those of us who have worked through the halcyon days of expansion in the sixties and early seventies.

First, we'd better be clear about exactly what we mean by 'managers' in this context. Which managers need retraining?

To be blunt, I would say the bulk of them! Indeed it has been recently estimated that some 80% of our managers have had no formal training whatsoever!

Those working in line management appear on the whole still largely unaware of the degree to which the success, or failure, of their strategy, be it in production, research planning, marketing, advertising or selling, is dependent upon the acquiring of the right type of information.

On the other hand, those—like you—the information managers—need both to make themselves aware of these information needs, and to acquire knowledge of all possible relevant data sources.

Furthermore, information managers need to be prepared to face the challenge of making those line managers in industry aware that to carry out their function to the optimum, they require such information.

What I'd like to do is to look at the type of problems facing those line managers today, examine the vast range of information which they require, explore briefly the type of retraining currently on offer and finally suggest how you can contribute to ensuring that the retraining of managers is correctly oriented.

I think the best way to illustrate the diverse range of information needed by today's managers is to go step-by-step through a major study which we recently undertook for a group of packers and pack manufacturers—our organisation specialises in the packaging field.

First, however, let me say just a few brief words about the pack manufacturing industry—this industry has been particularly badly hit by the recession. Demand has fallen back with depressed market conditions; imports of both unfilled and filled containers have increased rapidly by virtue of the high level of sterling and excess capacity abroad. Destocking took place in terms not just of the filled container, but also the empty. Profitability has declined to an extremely dangerous level; there has been a dramatic reduction in companies and manning levels.

Not least of the problems for both packer and pack manufacturer has been the increased power of the supermarkets which have been able by their increasingly oligopolistic position in the grocery trade to impose discriminatory discounts upon packers, who, fearful of losing such an important chunk of their livelihood, have then put pressure on the pack manufacturers to keep their price increases below cost increases, with a consequently highly adverse effect upon margins.

For the pack manufacturer to improve his return under these very difficult conditions, he has had to have two main objectives; first to increase his share of existing markets, and second to move into new markets—possibly by diversifying into the manufacture of different types of packs. Above all, he has had to ensure that he is getting the right pack, in the right place, at the right time, to the right people by using the right strategy.

To formulate that right strategy the manager needs an enormous amount of information, the need for which he certainly does not always recognise unless he is highly experienced.

He has to acquire a wide range of knowledge relating to both that multiplicity of industries which go to make up the packaging industry, and also to all end-use industries, both industrial and consumer, utilising that packaging.

In making forecasts he has to give consideration to a very wide range of current and future economic and political strategies. Indeed, unless one has some knowledge of the political field it is virtually impossible these days to be able to attempt any forward planning at all!

He has to be able to analyse all likely developments in respect of trends in consumer demand, including assessment of future disposable incomes, the likely rate of inflation, the balance of direct tax against indirect tax policies, the level of unemployment, reduction in the length of the working week and factors such as the likely patterns of development in retailing and wholesaling.

He has to be aware of all current and possible environmental legislation, the import/export factor for the different materials and products, which will involve considering the way in which international currencies are likely to move against the pound.

He has to be able to assess capacity situations abroad together with the levels of demand in those overseas markets.

He has to look at possibilities of diversification, the advantages or otherwise of vertical or horizontal integration, all aspects of location of new investment which involves consideration of sources of materials, suitability of transport networks and, increasingly, the situation in respect of the local climate of industrial relations.

He has to be aware of likely policies in relation to interest rates, exchange rates.

He can get none of this essential strategy right without correct, comprehensive and totally up-to-date information sources.

To return to the study I mentioned above. With the impact of both the huge rise in oil prices, and of the recession generally, a major problem for the pack manufacturer (and the pack user too) has been to know just what the cost and availability of competing packaging materials is likely to be over the coming half decade. Without this vital information it is impossible to plan future production, investment, or marketing strategy.

We therefore undertook such a study, forecasting the future cost and availability of both packaging raw materials and finished packaging. To go through this very briefly indicates the vast range of data a manager must utilise for any one study—data of which the information manager should, I believe, be even more aware.

The aim of the study was:

(1) To present a detailed analysis of the cost factor of each material.
(2) To assess the way in which these cost factors would move.
(3) To assess the raw material availability and availability of packaging materials.

The media we covered were:

(1) Aluminium foil
    Glass containers
    Tinplate cans and containers
    Thermoplastic materials:
        LDPE
        HDPE
        PP
        PS
        PVC
    Pulp based materials:
        packaging board
        packaging paper
        regenerated cellulose film
(2) Finished packaging based on these materials.

The method we used was to study:

(1) Background to the market—each material.
(2) The market—past five years to date.
(3) Factors influencing trends over next five years in:
        cost
        availability
(4) Estimated trends over next five years in:
        cost of material to user,
        i.e. price/availability balance
    Accompanying five-year forecasts:
    — general economic assumptions.
    — future cost and availability of energy.

In assessing the background to the market, we looked at:

(1) Brief description of method of manufacture, raw material usage.
(2) Location of industry, UK and internationally.
(3) Principal companies involved, market share.

Next we assessed the market for each of the packaging raw materials and finished packaging. We looked at the following factors:

(1) Movement in:
    demand
    production
    capacity
    end-use
    imports/exports
(2) Price movements
(3) Energy considerations
(4) Use of re-cycled materials
(5) Analysis of direct cost of production

Analysis of direct production costs was among one of the most difficult tasks for us, but nevertheless it was vital to get it right. We broke the costs for each material down into these main groups:

(1) Energy
(2) Raw materials
(3) Salaries and wages
(4) Transport including distribution
(5) Depreciation

Our sources of information were:

(1) Government departments and publications
(2) Trade associations and publications, and research associations
(3) Personal contacts in industry

Having pulled together all the relevant background data, we then embarked upon the Herculean task of forecasting future trends in cost and availability. First it was necessary to establish the way in which the UK economy as a whole might move, so we looked at the future:

(1) Growth rate of the economy
(2) Wage levels
(3) Rate of inflation
(4) Movements in sterling

We then had to examine those other factors which would influence the trend in costs over the next five years, viz:

(1) Technical developments to reduce cost per unit:
    e.g. increased through-put
    material savings
    increased labour efficiency

(2) Reductions in, or substitutes for, energy requirements
(3) Increased use of recycled materials
(4) Other factors:
    e.g. environmental legislation, plus
        likely movement in principal cost factors

Most important among these factors was the search for economy which hard pressed manufacturers would make their priority in the immediate future, in order to cut their costs per unit. This would be reflected over a wide range of their operations:

(1) *Reduced material cost per unit:*
    Reduced material usage:
        thinner gauges
        reduced wall thickness
        reduced overlap
        better design
        reduced waste
    Larger unit sizes
    Reduced overwrap
    Increased standardisation
    Substitution of more economic materials

(2) *Reduced processing costs:*
    Increased processing, filling, labelling, packaging speeds
    Increased automation
    Substitution of rectangular for round containers
    Reduced energy costs per unit
    Improved energy efficiency
    Substitution of material usage
    In-plant manufacture and labelling

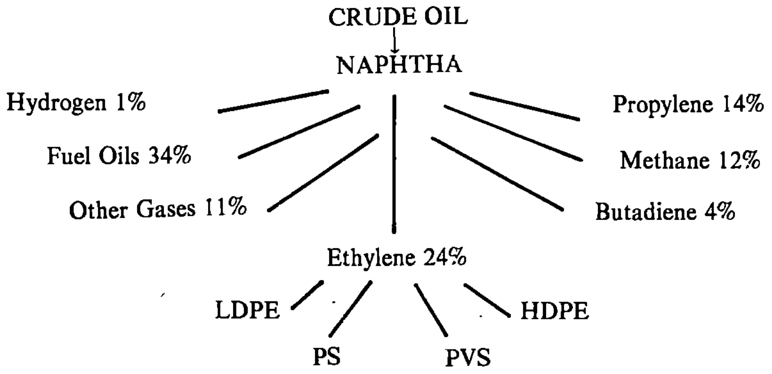
(3) *Reduced distribution costs*

Supply is, of course, a most important factor in determining price, so the likely availability of both the raw materials and finished packaging was then assessed in terms of:

(1) Future demand
(2) Future capacity
(3) Availability of raw material
(4) Availability of energy requirement

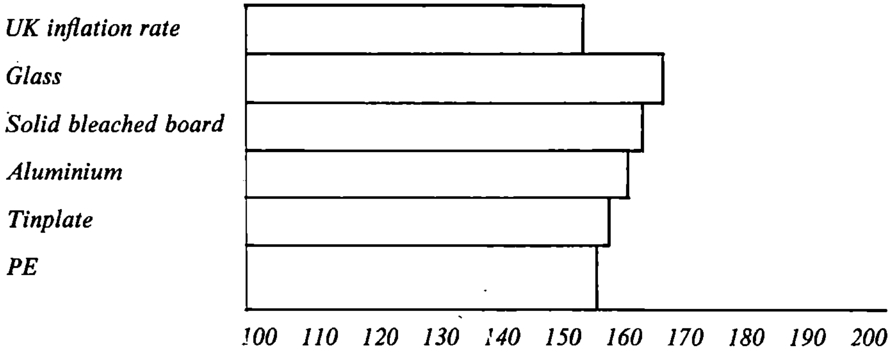
Economists, as we were, we had to take on the role of technologists in assessing the impact of some factors, such as the future availability of the various by-products of crude oil—essential building blocks to the plastic packaging industry!

By-products of crude oil



The findings were fascinating (and are available for purchase from PIRA—the Research Association for the Industry at Leatherhead). Most interesting to emerge was the fact that in spite of the wide variation in the range of contribution of cost factors to each material, the diverse source of raw materials and the different degree of opportunity for cost economy, the likely movement in the cost of the main packaging raw materials was likely to be fairly close—and slightly above the forecast rate of inflation.

Cost movement of selected packaging media, 1980–1985



1980 = 100

As you will appreciate the degree of information required to carry out this one project was enormous, but our consultants, trained in information retrieval, were able to assess what data they required, and how to obtain it.

In industry generally and equally in the services and distribution, to what extent does existing training set out to teach this—to what extent is training or retraining in management techniques offered to managers at all?

It is very interesting to note in this context that at the recent Conference of the Association of Teachers of Management, it was said 'Part of the problem is related to whether there is a definable body of knowledge called "management" which can be taught'.

It was pointed out that in all the 21 university business schools, and 24 management centres, the subjects included in the syllabuses are largely academic subjects, such as economics, law and psychology; that only recently added to these have been, for example, marketing, administration and computer studies—but no actual subject called 'management'.

Last year even the Director of the Manchester Business School admitted 'All we really need is a means of identifying first, what managers currently need to learn, and second, the educational resources most able to help them'. Clearly in respect of the first point, the gathering and dissemination of information should rank very high indeed!

Although we do offer training in business studies, the number of places offered in the UK are still very few indeed!

The number for social studies, for example, in 1982/83 in all the various seats of learning amounted to over 50,300 while for those taking business management the figure was 5,000! Furthermore, very few of those entering the professions, ultimately intending to work in industry, are given that training which would enable them to utilise to the optimum their professional expertise.

More relevant to the theme of this paper: of the existing retraining schemes, how many are really orientated towards the very vital task of teaching managers both to utilise and to be familiar with information technology?

The bulk of retraining schemes outside industry—as opposed to those instituted internally by individual companies—come largely under the aegis of the Manpower Services Commission. The best known of these schemes is the TOPS scheme (Training Opportunities Scheme), designated largely for the unemployed. In addition, the MSC runs a fairly wide range of smaller schemes for both employed and unemployed. There are the bodies of Further Education, the Open Tech, etc. Where they are run inside industry, they are all too often very haphazard indeed!

Taking TOPS first, some 59,300 individuals completed their training in the year 1982/83. Business training, however, was lamentably neglected, and although the numbers taking training in this field have grown from 300 in 1978/79 to 1,200 in 1982/83—this latter figure constitutes only 2% of total TOPS trainees! Training in the technical and computer field attracted a large number of applicants, with 7,000 taking part in these schemes—some 12% of the total. However, to what extent the latter offered the type of training in information technology which we have been discussing is extremely doubtful.

TOPS have also extended into the field of retraining the employed manager, with as their aim 'improving the quality of management training schemes'.

They are also running a Management Extension Programme where suitably qualified redundant executives work with small firms with growth potential.

The MSC is involved in a wide range of training schemes other than TOPS and has developed various projects, with, as their aim, again, the improvement of management—but as we have noted, nobody seems to have yet defined what that really is, and what the learning requirements are!

The Employment Relations Resource Centre has been set up in response to 2,000 requests from companies (a heartening development) for assistance in training managers and four new training packages have been launched. A Management Action Programme has recently been developed and run for the first time, helping 600 managers to improve company performance and achieve growth plans. New projects include an investigation of the impact of new technology on management training requirements. There is also a range of courses to enable employed managers, executives, professional and technical personnel to improve their skills, or train in new disciplines to 'take advantage of the changing employment market'—all moving in the right direction!

But to what extent is training given to managers of all types in respect of information technology? Far too small, I suspect, and the numbers involved are tiny relative to our needs.

What of the future?

The MSC topic (apart from the YTS) currently most under discussion is the proposed new Adult Training Scheme designed to open up wide spread opportunities for adults, whether employed or unemployed, to increase or update skills and knowledge. The discussion document is entitled the 'New Training Initiative', and is concerned with retraining by and large.

This is still in the discussion stage, with the CBI and the TUC contributing a valuable, and hopefully realistic input.

The CBI recommends the best use of existing resources, the removal of obstacles to effective training, that above all the training be orientated to market needs and the achievement of a higher degree of cost effectiveness. Most important, they advocate policies designed to change the attitude of individuals, to inculcate a more positive attitude to change, to accept the need for mobility, for example.

Hopefully in this document some considerable effort will be given to the problem of definition of what management really is and what managers need to learn!

There is clearly a great need, then, if we are to get retraining over the next two decades right, for industry, first to recognise its needs and second to make sure that all training bodies are also aware of them.

It is good, therefore, that the CBI (whose membership covers not just industry, but service and distribution too), has been brought in so early. It is absolutely essential that the message which we are trying to get over at this Conference gets through, and that training in the management of information is recognised as the truly essential factor in strategies for national recovery that it is.

This is, of course, where you come in. These needs are not fully realised in industry, which is still all too often production, and not marketing orientated.

There are several important ways in which you at this Conference can help—both as members of one or other of the professional bodies, and as individuals within your own organisation.

Where you are working as an information manager in industry you can increase your effort individually in your own organisation to ensure that information is not just available to the line managers when they request it; you can actively market it to all divisions throughout the organisation. Do not be surprised or discouraged if at first it is a thankless task! Where you are an information manager in a professional information body you must increase your efforts to contact those whom you know, (even if they do not!) have an information requirement. Study the industries in your area, assess what you know should be the information required for the individual companies—and be in touch!

Through your local and national links with MSC you must press your views even more strongly regarding the necessity to retrain managers so that they are able through the correct management of information to make that really vital contribution to national recovery, of which they are capable.

Get involved through Aslib to the degree that this body becomes the voice of national authority just as the CBI has done; through local radio, press and all other media make sure that the situation is achieved whereby anyone in any training area consults you when any question of planning management training schemes arises.

Are you participating with the MSC in the discussions on the New Training Initiative?

Be even more positive and increase your efforts to persuade the universities and business schools that a carefully constructed definition of those subjects which together go to make up 'management', including the management of information, is a really vital requisite for the curriculum.

Indeed, perhaps you could go further, and through links at secondary education level, persuade the more enlightened of our schools and Sixth Form Colleges to introduce information technology as a subject in its own right—it is never too early to start training the managers of tomorrow!

Progress in Information Sociotechnology: the ten-year syndrome

A. E. Cawkell

Citech Ltd

Paper presented at the Aslib conference 'Information for National Recovery: Needs—Resources—Technology', University of Stirling, Scotland, 13–16 September, 1983.

AT THE 1978 ASLIB conference, I gave a talk entitled 'The New Technology', subsequently summarised in a short article in this journal.[1] In it a drawing of something I called the 'Consumersole' appeared. This device, which was discussed in an article also published in 1978,[2] was a prediction of what might be used in homes and businesses at the end of the century.

In the second article I discussed viewdata, suggesting that 'implementation.... will depend upon the ability of information suppliers to anticipate demand. The expansion rate will depend primarily upon economic and social factors'—a very unadventurous but correct comment. The demand did not materialise.

I also talked about another proposal, widely discussed at the time, the 'Editorial Processing Centre'. It appears to have vanished without a trace.

It is impossible to say when or if ... the paperless revolution will be with us' was one of the concluding comments in the article. That phrase 'the paperless revolution' is not heard much these days: 'information technology' is the current term. Has the outlook changed since 1978?

Many different kinds of organisations and people are interested in information technology (IT). It is fashionable—which means that people like to be associated with it, either to enthuse about it, or condemn it usually with reference to 1984 and all that, governments have policies about it, companies take over each other or are bankrupted by it, millionaires are made by it, and new jobs appear and old ones vanish.

If you write about it, as I do, and purport to cover it, you have a problem in deciding what it is. It is even more difficult to decide what it isn't. The multidisciplinary nature of today's science is often discussed, but the sweep of IT, together with information itself, is extraordinary. The boundaries are hard to define and it is impossible to separate the technical and the human aspects. The latter is the more important. Computer people are notorious for being unable to understand that most people want English, not jargon, and are interested in what computers can do for them, not in an assiduously cultivated mystique.

Aslib Proceedings, **36** (3), March 1984, pp. 154–162. Printed in Great Britain

TABLE I. *A crude classification of Information Sociotechnology*

Communications
Local Area Networks
Message switching
Modems
Optical
Protocols; standards
Radio (cellular)
Satellite
transmission: voice
& data networks

Copyright, patents

Electronic publishing

Hardware
Computers
Electronics
Microcomputers
Standards
Storage

Inputs & outputs
CRTs & displays
Man/machine interface
OCR and images
Printers
Tablets & keyed
voice

Library & information science

Privacy
Data protection
Freedom; security;
transborder flow

Social & political
Deregulation
Economics & market
Employment
Office organisation
Management
Policy & politics
Quality of life
Telecommuting
Work & leisure

Systems
Cable
Computer conferences
Electronic mail
Expert
File organisation
Financial/EFT/Banks
Facsimile
Image processing
Indexing
Microcomputer
Microform
Office & home
Online/database
Optical
Tele-, video-conferencing
Teletex
Television
Video & videodisc
Videotex/teletext
Word processing

Information theory tells us that the most efficient way of storing, indexing, and retrieving information, is to sub-divide it under headings containing chunks of equal size. I have arranged IS under headings which seem to be definable as entities, hoping that the headings will survive rapid developments. This crude method of classification seems to work and I use it in the journal *Information Technology and People* to review different parts of the field as shown in Table 1. Information Sociotechnology is the right word to describe this hotch-potch. The publication mentioned above should have been called simply *Information Sociotechnology.*

'Systems' is simply an admission that I do not know what is going to happen next or which system, currently separately identifiable, is going to converge with another. If I can avoid it I don't want to use main headings which will be obsolete by next year. Information theory has been replaced by expediency.

TABLE 2. *Selected aspects of Sociotechnology: progress*

Item	*Progress* (5=fast, 1=slow)
Telecommunications	
Local Area Networks (LANs)	1
Networks and standards	1
Satellite systems	4
Fibre optic	2
Electronic publishing	2
Inputs & outputs	
Displays	4
Man/machine interface	1
Tablets	1
Voice	1
Social & political	
Data protection/privacy	2
Deregulation	2
Office reorganisation/behaviour	1
Systems	
Cable	1
Electronic Funds Transfer (EFT)/Financial	3
Electronic mail/office	1
Fax/document delivery	1
Microcomputer	2
Microforms	1
Optical storage	1
Teleconferencing	0
Teletext	3
Teletex	0
Videotex	1

Substantial developments have taken place in the four sections listed under 'Telecommunications'. LANs—a way of interconnecting different kinds of office machines with automatically controlled inter-machine data transmission on a single site—originated with the ALOHA network.[3] It took about 10 years before working systems were installed in any quantity. Currently a number of manufacturers are competing for customers who seem to be rather reluctant to move quickly in case they opt for a system which turns out to be non-standard.

Nearly all national and international data networks have adopted packet switching—a method for splitting up messages, repacking them efficiently to use the minimum necessary number of transmission channels, and reassembling them for delivery to the correct addressees. A measure of agreement has been reached so that networks can be interconnected without compatibility problems. This is gradually changing Euronet and a set of separate European PTT networks into a unified network. The process may near completion in 1985—an interval of about 15 years following the pioneering work with ARPANET in the US around 1970.

The current state of data telecommunications enables those organisations whose traffic volume justifies special arrangements to lease lines and use standard equipment for their intra-organisation requirements. For everybody else the situation is chaotic. The same kind of equipment made by different manufacturers will not intercommunicate, and when, eventually, it does, different kinds of equipment which are gradually converging into multipurpose devices must be tackled. Standards are awaited for traffic control and equipment in a world where, on the one hand, committees are struggling valiantly to try and get agreement between many manufacturers, and on the other, dominant companies are trying to set *de facto* standards. Universal data communications are a long way off.

Substantial progress has been made with fibre optic cables which can now be installed without the need, as with other cables, for repeaters (amplifiers) at frequent intervals en route, and whose cost is now competitive. The next transatlantic cable will probably be fibre optic. The idea was first mooted in 1966,[4] the development of more efficient monomode cables accelerated the process, and such cables started to be installed in 1980—an interval of 14 years.

However it is satellite communications, coupled to space adventures and the prospect of direct broadcast television into home receivers which have captured the public interest. In 1946 A. C. Clarke suggested that global communications would be possible using three appropriately placed geostationary satellites[5] as shown in Figure 1. Many years passed before this became possible, but by 1980 satellites were being routinely used as relay stations in the United States. Table 3 shows how the transponders (separate send-receive systems) were allocated on Satcom 1 in 1981. In this case it took 18 years

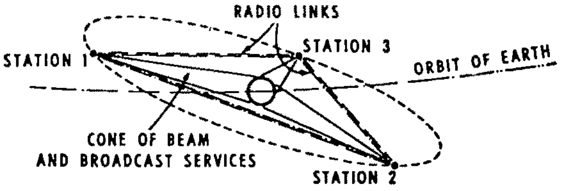


FIG 1. *Clarke's proposal for global satellite communications (courtesy of The Wireless World)*

for the idea to be falteringly realised, a further 10 years before satellites became used as telephone relay stations with the Intelsat network, and several more years for TV satellites. Satellites are marked 4 out of 5 in recognition of a technological achievement without parallel (with the possible exception of semiconductor electronics) in a reasonable period of time.

TABLE 3. *Transponder assignments on Satcom 1*

Transponder	*Leesee*	*Transponder*	*Leesee*
1	Warner-Amex Nickleodeon	13	not used
2	People That Love	14	Cable News network
3	United Video (WGN Chicago)	15	Warner-Amex
4	not used	16	Showtime (Compact Video)
5	Warner-Amex Movie Channel	17	Showtime (Eastern Micro)
6	South'n Systems (Atlanta)	18	Reuters
7	Education & Sports Network	19	Times-Mirror movies
8	Christian Broadcasting	20	Home Box Office (Cx.E)
9	USA Black Network	21	Home Theatre Network
10	Showtime (Western feed)	22	Home Box Office (West)
11	Warner-Amex music channel	23	Home Box Office (Cx.W)
12	Showtime (Eastern feed)	24	Home Box Office (East)

Electronic publishing means different things to different people. According to one very good publication[6] it means the computer-aided production of printed products and the use of different technologies to distribute information electronically. For librarians and scientists interest has been more narrowly centred on the 'electronic journal', suggested in 1976,[7] pioneered with mixed results in 1979–1982,[8] and the subject of further experiments today.[9] It seems unlikely that the final form will replace the scientific and social functions of the conventional journal for many years.

Like many other methods of distributing information electronically, practical solutions await the placement of a communications and terminal infrastructure with a customer base of critical mass. The prospect of profits in consequence of mounting the nth service at relatively low cost will provide the incentive for further expansion.

The problem of developing input and output devices to match human needs have also progressed rather slowly. Several attempts to replace the keyboard with a method of changing information into machine-readable form (Micropad, Data Tablet, Telepad) do not seem to be used very widely. Single font OCR machines cost about £5000, selectable multi-font £20,000, and the Kurzweil KDEM, capable of reading a document containing many fonts ranging from 6 to 24 point at 56 characters/sec, £74,000. The Kurzweil reading machine, a sensational device which generates speech from documents presented to it costs 'only' £25,000. The price difference is accounted for by the higher accuracy requirements of the KDEM. Semantic redundancy enables acceptable speech to be reproduced with much lower accuracy requirements.

Voice synthesisers, as used in the Kurzweil reading machine, are much easier to devise than voice recognisers. The latter would of course eliminate the need for acquiring skills to control machines or input data. It has turned out to be extremely difficult to design an electronic device which can recognise continuous speech from any speaker. According to a classic 1976 article[10] it will be many years before this becomes possible. Some people think it will not be for another 50 years.

Even so some useful, if limited, recognition devices are available today. The 'latest word in voice recognition' according to a 1983 article, which means something which you can buy for a reasonable price, is the $5000 Votan V5000 unit, capable of recognising 256 different words from a speaker, given a training session with the speaker.[11] Later in the year a Japanese single-chip speech recogniser was announced capable of recognising 200 words with speaker adaptation.[12] Speech recognition boards with limited performance are available for plugging into microcomputers.

A very large research effort seems to have produced rather limited results, but this simply reflects the difficulty of the problem. In this case the interval between the first substantial research work in the seventies and the application of continuous speech recognition may well be 50 years.

Little need be said about the man-machine interface in the area of machine control by the observation of displayed information. The subject is still in its infancy. However you will note that information displays are scored 4 in Table 2. This is because the possibility of breaking out of the cathode ray tube strait-jacket is upon us. New developments in manufacturing and addressing problems for large screen plasma or LED displays imply that one element in Vannevar Bush's Memex machine—a very large flat screen—may be with us in the foreseeable future. It is hard to imagine what the effect would be of, say, 50,000 easily controlled characters with graphics, compared with today's 2000 characters at a time devices. Xerox Star and Apple Lisa use small-screen CRTs but the ideas are ready for the big screens. Perhaps this will be with us in 5 years time—and that is 60 years after the CRT, not much changed today, was first introduced by Von Ardenne in the 1920s.

Three issues demanding attention in 1983 are listed under 'Social and political' in Table 2. The Data Protection Bill and the Telecommunications Bill are before parliament and both are controversial. Secure under the convenience of an absurd Official Secrets Act, all UK governments in this century pledge changes in this area at election time and do nothing when in power. The present government is acting only because it has been compelled to do so in order to provide the minimum protection required by the 1981 Council of Europe convention. Neither this issue, nor the deregulation of British Telecom (BT) need much discussion here because they are featured so frequently in the daily press.

With regard to deregulation, the idea of allowing more competition in telecommunication equipment and services seems to be acceptable to most people because BT under the old Act was organised to provide a telephone service, not data transmission/processing services. The computer/telecoms industry is a different animal; rapid obsolescence, intensive marketing, and quick adaptation are the rules. BT's size, staff commitments, and ability to change rapidly and sell things are a problem. Its purchasing power, and its insistence until very recently, of buying equipment of ancient design, was a major reason for the decline of a once dominant UK industry. Privatisation—that is a transfer of ownership to shareholders—is much more controversial. For a more complete discussion of the issues see ref. 13.

Changes in office organisation, and particularly productivity improvements in an area which has not changed much since Dicken's time, are another topical issue. The success of word processing has provided office equipment suppliers, not renowned for their modesty, with ammunition to generate expectations of other remarkable advances. There is little evidence to suggest that the changes brought about in the generation of text, mainly involving one section of the office community, is a prelude to sensational changes in other parts of the office. There will undoubtedly be improvements in some other routine operations, such as form filling, but the intangible requirements needed to improve the productivity of people further up the hierarchy—and higher salaries imply a bigger potential impact—will be hard to fulfil.

Finally, a few words about systems. EFT and teletext score highest. In these two very different areas, electronics in banking has revolutionised the flow of information and teletext has been quietly successful—one of the few information services to be widely used in homes, and, so far as the electronics are concerned, one of the few world-wide British electronic production successes. Videotex—a term which does not usually include teletext, and often means viewdata-like systems, has been much less successful, although private business systems are gaining ground. The major reason for the success of teletext in the UK has been that TV sets including the facility do not cost much more than ordinary sets, and there are no bills for it (which is not quite the same as 'free').

I don't know why so many microcomputers are purchased for use in the home or what people do with them. You may think that a score of 2 is too low for larger systems with 64K or larger memories, and 1 Mbyte or more of disk storage costing £2000 or more, used mainly for business purposes. They still have some way to go in respect of reliability, ease of use, and integration of software into really useful packages. The rate of development of integrated circuits and storage devices has not been accompanied by the same rate of progress in assembling the bits and pieces into a useful machine easily utilised by a non-computer buff.

It seems likely that word processing machines will gradually disappear. The latest word processing software on the new micros is as good as a dedicated WP machine. One machine in a small business will suffice for reports and correspondence, information retrieval, accounts and stock-keeping.

I sat next to a person in the systems division of one of the world's largest multi-national companies, at an October conference last week. Assuming that office systems and certainly electronic mail would be in full spate, and being always interested in applications as opposed to wishful thinking, I asked about their electronic mail system, presumably in use between all divisions and countries. They don't have one. Several trials have been abortive. The political problem of getting all parts of the company to accept a single system has turned out to be unsolvable!

Technical advances have been rapid in image processing systems,[14] including facsimile which could be the principle adopted for document delivery in the library sense. Progress in actually using information technology for document delivery has been slow. It appears that at present the price premium for speed with an appropriate reproduction quality is too high. In business, agreement on standards has resulted in the production of compatible machines which are becoming quite widely used for the transmission of orders, drawings, messages, urgent reports, and to a lesser extent, correspondence. Facsimile machines of rather low resolution have been available since the 1930s. After the war, machine compatibility was the problem. The interval between the introduction of the first useable machines, and fairly widespread use in business was 50 years.

Teletex, a system for transmitting text rapidly between telex-replacement/ word processing machines, is awarded 0 for much talk and practically no progress, microforms—around since the Franco-Prussian wars—find limited application, and the promise of inexpensive read-write optical storage awaits fulfilment.

I conclude that any given aspect of information technology will take at least 10 years from point A in time to point B, where B is useful small scale application. Point A—the 'starting date' is hard to define. It is not so much that something significant actually happens on that date, but that we are told that 'great interest is being expressed in turboencabulators', or that 'Colossus Systems Ltd, is reported to be building a new plant for the production of Widgetisors'. The information technology industry is skilled in convincing us that only fossilised people can afford to ignore 'imminent' developments which are still a gleam in the inventor's eye.

REFERENCES

1. CAWKELL, A. E. The new technology. *Aslib Proceedings*, **31** (1), January 1979, pp. 29–32.
2. CAWKELL, A. E. The paperless revolution. Forces controlling the introduction of electronic information systems. *Wireless World*, **84** (1511/1512), July/August 1978, pp. 38–42, 69–74.
3. ABRAMSON, N. *Computer Communication Networks*. (Chapter 14). Prentice-Hall, 1972.
4. KAO, K. C. *and* HOCKHAM, G. A. Dielectric fibre surface waveguides for optical frequencies. *IEE Proceedings*, **113** (7), July 1966, pp. 1151–8.
5. CLARKE, A. C. Extra-terrestrial relays. *Wireless World*, **51**, October 1945, pp.305–8.
6. GURNSEY, J. *Electronic publishing trends in Europe and the United States*. (Electronic document delivery III). Oxford: Learned Information, 1982.
7. SENDERS, J. The scientific journal of the future. *American Sociology*, **11**, August 1976, pp. 160–4.

8. TUROFF, M., *and* HILTZ, R. The electronic journal—a progress report. *Journal of the American Society of Information Science,* **33** (4), July 1982, pp. 195–202.
9. SHACKEL, B. The Blend system: programme for the study of some electronic journals. *The Computer Journal,* **25** (2), 1982, pp. 161–8.
10. REDDY, R. D. Speech recognition by machine—a review. *Proceedings of the IEEE,* **64** (4), 1976, pp. 501–31.
11. SEAMAN, J. The latest word in voice recognition. *Computer Decisions,* **15** (2), 1983, pp. 40–52.
12. KIMURA T., YANO, T., *et al.* A single chip self-contained speech recogniser. *IEEE J. Solid State Circ. SC18* (3), June 1983, pp. 344–9.
13. CAWKELL, A. E. Privatised British Telecom and UK telecommunication futures. *Communication Technology Impact,* **5** (7), October 1983, pp. 2–9.
14. CAWKELL, A. E. Human, electronic and reprographic aspects of image and text processing: a tutorial and review. *Program,* **17** (3), July 1983, pp. 111–129.

Discussion

SESSION THREE

The following points were made during the discussion:

Rzevski paper

The different information needs and seeking habits of engineers as compared with general scientists were acknowledged. The services of the British Standards Institution were quoted as an example of appropriate information provision to industrial designers.

There was some disagreement about the relative effort which should be exerted by librarians in classifying the information to engineers' requirements and by engineers in (a) searching for information and (b) pressing the case for better-funded and more sophisticated information services.

Cannon paper

Deskilling will affect mainly women in retail and manufacturing industry: men will assume the power and authority.

New from Blackwell Scientific Publications

Health Libraries Review

A journal for Medical, Health and Welfare Librarians

Edited by Mrs Shane Godbolt, *Charing Cross Hospital Medical School, London*
Mr Paul Valentine, *St Bernard's Hospital, Middlesex*

- to help health and welfare librarians
- to publish both longer pieces of original thinking and research, and shorter news reports, communications and announcements
- to keep in mind the needs of patients and clients, as well as those of professionals
- to explore new information technologies and their use
- to act as a way to exchange news and views with librarians in other countries

These are the aims of *Health Libraries Review.* To achieve them, the journal goes deeply into specific issues and problems, while covering a broad range of topics of interest to medical health and welfare librarians. Talking books, public health education, the reading habits of doctors and nurses. . . there is room in *Health Libraries Review* for topics as diverse as these. Incorporating the newsletter of the Medical Health and Welfare Libraries Group of the Library Association in Great Britain, the journal will reflect the needs and interests of medical, health and welfare librarians.

Subscription Information

Health Libraries Review will be published quarterly and the subscription rates for 1984 are £27.50 (UK), £33.00 (overseas) US$55.00 (USA and Canada)

Blackwell Scientific Publications Ltd
P.O. Box 88 OXFORD

3 IMPORTANT NEW PUBLICATIONS FROM ASLIB

Creating an Information Service, by Sylvia Webb

Sylvia Webb describes in a positive and practical way how to set about the task of establishing a library or information service with little assistance from support staff. This volume has particular relevance for those working as one man bands, i.e. those running a service single–handed, and those who may have little experience in the operation of special libraries. The emphasis is on simplicity and efficiency in all the procedures and techniques discussed, and checklists are provided to help the reader to establish an appropriate and properly integrated service.

(ISBN 0 85142 186 5) UK £9.50 (£8.00);** overseas £11.00 (£9.50)

The Translator's Handbook, edited by Catriona Picken

Just published, the Translator's Handbook provides an essential guide to the growth industry of translation. A completely revised and enlarged edition of Technical Translation Manual, published in 1971, this new volume pays close attention to every detail of the translators' profession – including working procedure, training, relations between translator and client, and the description and enumeration of hardware and reference material.

(ISBN 0 85142 173 3) Hardback UK £18.00 (£16.00); overseas £21.00 (£18.00)
Paperback UK £13.50 (£11.50); overseas £15.50 (£13.50)

Library Automation: a current review, by Peter Gillman and Silvina Peniston

This report examines areas of library automation in terms of the hardware and software available. It deals with systems intended for library automation, with examples of the use of these systems. It also covers some wider aspects of information technology which may be used in libraries.

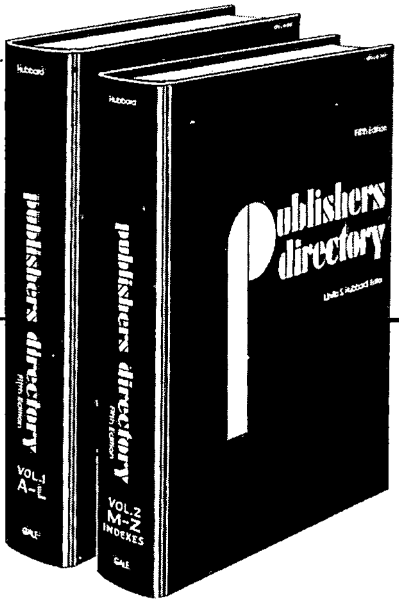
(ISBN 0 85142 188 1) UK £11.00 (£9.00); overseas £13.00 (£11.00)

**(Aslib Members' prices shown in brackets)

Professional publications are only one of the ways Aslib can help. Ask us for our new membership brochure and find out more.

Aslib **The Association for Information Management**

Aslib 3 Belgrave Square
London SW1X 8PL
telephone 01-235 5050 telex 23667



Just published...The 1984 guide to over 9,000 active publishers...

Publishers Directory

...A Guide to New and Established, Commercial and Nonprofit, Private and Alternative, Corporate and Association, Government and Institution Publishing Programs and Their Distributors.

5th edition. Edited by Linda S. Hubbard. (Formerly *Book Publishers Directory* but now expanded to include selected publishers of classroom materials, reports, databases, software, maps, calendars, cards, prints, etc.) 1,630 pages in 2 vols. $225.00/set. Inter-edition supplement, $135.00.

The new *PD* provides complete profiles on some 9,300 U.S. and Canadian publishers: name, address, phone number, year founded, principal officers and managers, number of titles per year, representative titles, description, discount schedules, returns policies, and much more.

New edition covers 122 distributors and wholesalers...and identifies defunct publishers. Index of publishers, imprints, and distributors includes publishers in *Literary Market Place* (note that *PD* does not duplicate coverage in *LMP*). Also includes subject index using 275 terms and geographic index.

Available on Standing Order at 5% discount.
All Gale books are sent on 60-day approval.
Deduct 5% if you send check with order.
Customers outside the U.S. and Canada add 10%.

GALE Research Co.
Book Tower • Detroit, MI 48226

To order by phone: **800-521-0707 tollfree.**
In Canada, Michigan, Alaska, and Hawaii: 313-961-2242.

Aslib
Proceedings

VOL. 36 NUMBER 4 APRIL 1984

A microform policy to reduce the physical growth of industrial libraries 165
A.R. Blick and S.M. Ward

Document transfer by satellite 177
Bob Winfield

Word processing in information services 187
Penelope A. Yates-Mercer and Ailsa A.S. Bracegirdle

Problems at work 201
Margaret Slater

ISSN 0001 253X

ASLIB PROCEEDINGS

Volume 36 **APRIL** **Number 4**

Aslib Proceedings carries papers given at Aslib meetings and conferences, and contributed papers of interest to practising professionals. These describe innovations in information management techniques, applications of existing information products and services, and case studies of information units and special libraries. The contents of the journal are reviewed by an editorial board.

Aslib Proceedings is published monthly and supplied free to members of Aslib. Annual subscriptions to non-members: £50 (UK)/£60 (overseas); additional subscription to members: £30/£35. Single copy prices and subscription information are available from the Subscriptions Department, Aslib, 3 Belgrave Square, London SW1X 8PL.

Manuscripts and editorial enquiries should be addressed to the Editor, *Aslib Proceedings,* Aslib, 3 Belgrave Square, London SW1X 8PL. Manuscripts should be 1,000 to 3,000 words, typewritten, double-spaced, single-sided on A4 paper. Figures should be reproducible. An abstract of up to 200 words should be included. References should follow British Standard 5605:1978. Published authors will receive twenty-five free offprints of their article.

Advertising information is available from the Editor, as above. Further information about Aslib's services and membership rates will be supplied on application to the Director, Aslib, 3 Belgrave Square, London SW1X 8PL. Telephone: 01 235 5050; telex: 23667 (answer-back Aslib London).

© 1984 Aslib and contributors **ISSN 0001 253X**

A microform policy to reduce the physical growth of industrial libraries

A.R. Blick and S.M. Ward

Beecham Pharmaceuticals Research Division

Introduction

IT IS AN IRREFUTABLE fact that all libraries, no matter what their size, will eventually run into storage problems. The solution may be, as with the British Library, to build more and more storage facilities at the cost of millions of pounds. However, for industrial libraries a request for more and more storage space is not a solution which is likely to be well received by higher management, especially as the cost of floor space in buildings escalates. Therefore, another answer must be found. This paper discusses a policy which has been adopted in the libraries of the Research Division of Beecham Pharmaceuticals. The policy involves the extensive use of microfiche holdings of journals in the libraries; to the surprise of many people this has not generated adverse reaction from the customers. The policy does not stop the library stock from growing but substantially reduces the rate of growth. It is not achieved, however, without an overall increase in cost which must be set against the alternative cost of additional storage space.

The policy was adopted after consideration of several alternative approaches to limiting growth. It was considered to be the policy most appropriate to meet the customer needs within the constraint of reducing the rate of growth.

Background

Beecham Pharmaceuticals Research Division is spread across five sites which are well separated both physically and in the nature of the pharmaceutical research performed. Each site has an information service unit which includes a library. In three of the five libraries, space has been at a premium for some time and at the other two libraries, space problems could be foreseen in the near future. Various attempts were being made to overcome the space problem in the libraries, the most common action being to jettison old journal holdings to make space for the newer issues. This was a soul-destroying activity as it involved discarding (frequently to a waste-paper dump) bound volumes of journals in good condition which were still relevant to the research workers' interests but which were quite old. Thus a valuable and costly resource was discarded and the journal runs available to the user were reduced.

Aslib Proceedings, 36 (4), April 1984, p. 165–176. Printed in Great Britain.

The main growth in these libraries arises almost wholly from journals and from secondary publications such as *Chemical Abstracts*. Some growth occurs with books and pamphlet literature but this is minimal in comparison with journals and abstract publications. Secondary storage facilities are very limited at all sites and these 'stores' are under pressure from other departments requiring space for more active purposes than storing old journals.

The library and information activities in Beecham Pharmaceuticals Research Division operate across all the sites on a co-ordinated basis. Amongst the co-ordination activities are periodic meetings of working parties. One such working party exists on 'library matters', the membership comprising the unit head or librarian from each site together with the Information Services Co-ordinator as chairman. It was this working party which determined the future policy for the libraries. Concurrently, new accommodation was provided for one of the site libraries (at the Medicinal Research Centre, Harlow) and many decisions on space-saving actions had to be made for this new library area. The desirability of a Divisional policy had been apparent for some time but the move to the new library at Harlow precipitated the need. The space allocated for the new library had to be sufficient to cope with the next ten years at least but the space was very limited. Therefore the design of the library had to be such that little or no growth of the physical size of the library holdings could be permitted. A detailed design study was carried out by the staff of the Harlow unit and showed that the only way this could be achieved was by the extensive use of microform.

The designing of the Harlow library took place at the same time as the Divisional policy was being formed and many decision points in its design were incorporated in the overall policy. The policy therefore evolved with the design of this new library and was fully implemented at this Harlow library from the time it was transferred into the new area. A more gradual and incremental approach is being adopted at the other libraries.

Alternative holdings policies considered

Four alternative approaches for containing or reducing the growth rate of the libraries were considered. The 'Synectics' approach[1] was used to generate the ideas. The alternatives are given below, together with their main advantages and disadvantages.

(a) Retain all hard-copy journals and bind them.

Advantages	*Disadvantages*
1. Maximum user convenience – all journals to hand in bound form	1. Ever-increasing space required
	2. Journals 'disappear' from library for binding

Advantages

2. No special equipment (eg readers/viewers) required
3. No increase in cost involved

Disadvantages

3. Cost and difficulty of replacing a lost volume can be appreciable
4. Considerable floor weight loading
5. Appreciable binding costs
6. Periodic rearrangement of stock necessary

(b) Retain hard-copy journals for a limited period, ie dispose of older volumes of the journal runs on a regular controlled basis.

Advantages

1. Growth of journal stock contained
2. No special equipment (eg readers/viewers) required
3. No increase in cost involved

Disadvantages

1. Holdings of journals curtailed and therefore customers inconvenienced
2. Journals 'disappear' from library for binding
3. Cost and difficulty of replacing a lost volume can be appreciable
4. Considerable floor weight loading
5. Appreciable binding costs
6. Reliance on external sources (eg British Library) increased
7. Costly resource thrown away

(c) Substantially replace hard-copy journals by microform after they have been in the library for a period (eg 3–5 years).
Do not bind any journals.

Advantages

1. A small and very slowly increasing space requirement
2. All stock held in library at all times
3. No binding costs
4. Lower floor weight loading
5. Possibility of automation of microform holdings

Disadvantages

1. Increased subscription cost for microform version of journal
2. Special equipment (readers/viewers) required
3. Possible customer reaction

(d) Do not purchase primary journal—rely on secondary sources and loans

Advantages	*Disadvantages*
1. No space required for journal storage	1. Substantial (and unacceptable?) reduction in service for customers
2. No journal subscription costs	2. Substantial increase in interlibrary loan costs
3. No binding costs	3. Delays in information transfer
4. No equipment required	4. Loss of journals used for current awareness

Findings

Alternative (c) was selected as the one with the most advantages, even allowing for the disadvantage of an increased cost. Much has been written and said about user resistance to microform but this was not used as a factor in the decision-making process as the evidence for its existence was limited and largely anecdotal.[2]

In the course of designing the new Harlow library and in working-party discussions, consideration was given to having the secondary publications, eg *Chemical Abstracts, Index Medicus,* etc, in microform. The decision reached was that the primary journals were more appropriately held in microform and that secondary publications should be in hard copy. The basic reasons for this decision were (1) the legibility of the indexes in microform could be a problem; (2) multiple use of these abstract publications at the same time was a common occurrence which would cause access difficulties if they were in microform; (3) at the time the decision was made most of the secondary publications were available in microfilm only, and, as explained below, microfiche was the preferred format; (4) the automated microfilm search machines were noisy and expensive and took up considerable space themselves.

Fiche vs film

Journals in microfiche or microfilm cost much the same but there are a few more journals in microfilm than microfiche. However, the equipment for using the two forms is quite different. Generally speaking a good film reader has machine drive for the mechanical winding of the film into the viewer. This makes the viewers noisy, a point emphasised by other writers.[3] It was envisaged that, in order to obtain good customer acceptability of the microform version of journals, there should be a reader on most desks in the library. It was obvious therefore that microfiche readers which do not require a driving mechanism would be much quieter. They are also substantially cheaper, approximately one-fifth the price of film readers. A single microfiche is much more vulnerable in the hands of a user than is a microfilm, as microfilm is usually protected in a cartridge or cassette. This concern about the microfiche was largely removed by the use of the purpose-designed holders described later. These holders also increased the convenience of users as they could be kept on the shelves with the hard-copy version of the journal.

Another area of concern was copy costs. It was considered possible that, if reader-printers were readily accessible to the users, they would make copies of the items which were in microform rather than read them on the viewers. In order to remove the possibility of this happening, it was decided that viewers alone would be provided on the library desks and that the reader-printer facility would be in a separate area under the control of the library staff.

Speed of access was another factor considered important. The two-dimensional format of microfiche and the relatively small number of pages on a fiche make it quicker and easier to locate a single page on fiche than on microfilm. This latter format is uni-dimensional and can contain several thousand pages.

Policy adopted

Earlier journal use studies in Beecham Pharmaceuticals Research Division libraries had shown that most journals were used frequently in the first two or three years of their life but after about five years their usage dropped considerably. Such use patterns have often been quoted in the literature. It was decided therefore that the policy should be to divide the journals received into two categories: (1) the ephemeral journals of short interest, eg *Chemical Engineering News, New Scientist*, which would be retained in paper form for five years, *unbound*, and then disposed of; (2) the journals of permanent value, eg *Journal of the Chemical Society, Nature*. Journals in this latter category would be retained in paper form for five years, *unbound*, after which time they would be disposed of, but at the time of each subscription's renewal, a subscription to the microfiche version of the journal would be purchased. This microfiche version of the journal would replace the paper copy at the five-year stage and would be retained forever.

The result of this policy means that no primary journals will be held in paper form for more than five years; no primary journals will be bound; the library stock of permanent-value journals will increase with limited impact on space as all journals of more than five years will be in microfiche.

Estimated cost

Figures later in the paper will exemplify the cost of the microfiche subscriptions, and of the savings derived from not binding journals. However, the total increase in cost for all the Beecham Pharmaceuticals Research Division libraries to *fully* adopt the policy was estimated to be an increase of 11 per cent on the primary journal budget.

Practice

The policy outlined above has now been in operation at the Medicinal Research Centre library at Harlow since Autumn 1980. As stated earlier, the move at that time of the library to new accommodation generated a detailed design study of a microform-based library. If no changes to existing practice had been made, space problems inherent with hard-copy holdings would have been encountered within a short time.

Prior to the move of the library to its new accommodation, microform versions of some journals were obtained to replace some hard-copy holdings, and back run holdings of some high usage journals were extended by microform holdings where appropriate. Some of this back run material was only available as microfilm. As it was decided that microfiche was the required format any microfilm titles were jacketed to create fiche. At the same time, current subscriptions were placed to microform editions of journals subscribed to in hard copy.

To meet the policy completely, of a total number of current journal subscriptions of 173, ideally about 150 would be obtained in microform. (This excludes the ephemeral and newspaper-type journals.) Of these 150 titles, 88 (approximately 59 per cent) are available in microform at the time of writing. A few (8) of these subscriptions are only available as microfilm and these are jacketed in-house. However, the vast majority are obtained from the publishers as microfiche.

Microform subscriptions are obtained via a subscription agent. Although most of the required material comes from two main sources, University Microfilms and Pergamon Press, the use of a subscription agent avoids the problems sometimes encountered with the passage of microform through Customs. These difficulties occur more frequently when importing microfilm rather than microfiche.

It would seem that the availability of microform journals is increasing, with most major publishers now releasing their journals in this format. Most of the current subscriptions placed result in receipt of the *previous* year's microform, although Pergamon Press also provide microform *simultaneously* with the hard-copy issues.

Costs

The price of a microform subscription is invariably less than the corresponding hard-copy subscription. However, the price of microform does vary dramatically. In some cases the difference between hard-copy and microform costs is very marked as illustrated by the University Microfilms and Pergamon Press subscriptions in Table 1.

The price of microfiche and microfilm is usually comparable although in some instances the cost of microfiche is the higher of the two.

The increase in subscription costs resulting from purchasing journals in both hard copy and microform is currently running at about £4,500 per annum in the Harlow library. This increase is partially balanced by a number of factors:

(1) Decrease in binding costs. It is estimated that approximately £1,800 per year is saved by not binding issues of journals received as microfiche

TABLE 1. *Cost of hard copy subscriptions vs microfiche subscriptions (1982)*

Journal (University Microfilms)	*Hard copy*	*Microfiche*
British Journal of Cancer	£85.00	£8.77
British Journal of Pharmacology	£99.50	£12.86
Experientia	£122.15	£12.34
Journal of Physiology	£315.00	£40.26

Some microfiche subscriptions, especially Pergamon Press titles, are more expensive than this:

Journal (Pergamon Press)	*Hard copy*	*Microfiche**
Biochemical Pharmacology	£307.35	£146.34
Life Sciences	£294.50	£140.24
Tetrahedron	£460.98	£219.51

*These prices are for simultaneous microfiche but with a 50 per cent discount as both hard copy and microfiche subscriptions to the same title are ordered through the same subscription agent.

(this figure is based on the total saved, £2,150, minus the costs of the microfiche binders, £350). Binding costs still remain for journals unavailable in microform and thus in this area the ideals of the policy have had to be modified.

(2) Decrease in interlibrary loan costs. Requests for articles from issues of journals which would have been discarded without the microform policy can still be satisfied in-house.

(3) Possible revenue from selling hard-copy issues. This factor was not anticipated to make any significant contribution to costs when the policy was devised. However, subsequent investigations revealed that revenue from this source is at a peak if the hard-copy material is sold quickly, eg one year after receipt. In this area the practice is again differing from the policy as some hard-copy issues are retained for a shorter time than originally envisaged in order to maximise resale value.

(4) Space saving. The cost of this is difficult to quantify precisely but is the most beneficial factor of all.

A calculation of the approximate increase in cost resulting from the microfiche policy indicates an overall increase of 7.5 per cent on the primary journal budget. This figure represents a maximum value and does not allow for the decrease in the interlibrary loan costs and the value of saving space. The figure is somewhat less than the estimated 11 per cent calculated when formulating the policy, but takes no account of any extra time required to process the microform subscriptions. Although time and effort are saved by there being less journal binding, it does take time to order, accession and file the microform subscriptions. This additional task is not usually too onerous although the practice of some commercial microfiche suppliers to exclude the page numbers from each fiche means that considerable time has to be allowed for typing this vital information on the individual fiche.

Microfiche filing

The microfiche are housed in individual envelopes in commercially available purpose-designed folders which have inserts holding pages of fiche. Handling the fiche in envelopes and storing them in folders seems to provide sufficient protection against scratching, excessive dust and dirt, etc. The spine of each folder is clearly labelled with details of its contents—title, year, volume, etc, and labels inside show divisions into various volumes or page ranges. (As mentioned previously it is sometimes also necessary to type page numbers onto the fiche.)

The journal shelves in the library are all at the same distance apart, set to accommodate the height of the microfiche folders and therefore any moving of journal stock does not necessitate readjustment of shelves. The microfiche folders are housed next to the unbound hard-copy journals on the shelves, not in a separate location as would be necessary if microfilm was the format used. This blending of microfiche and hard-copy issues is seen to be a very important feature of the overall design of the policy.

The optimum length of time for which hard-copy issues are retained before being replaced by the microfiche version is still being investigated and, as explained earlier, departs from the stated policy in some instances. As far as can be established, the relatively early disposal of hard-copy issues has not resulted in any problems for the users.

To try and overcome possible problems of misfiling of fiche, scientists have been requested to place any fiche they have consulted in boxes provided on each desk. These fiche are refiled daily by library staff. Problems of more than one person wishing to consult the same fiche on the same day are rare and it is possible for statistics on journal usage (titles and years consulted) to be gleaned from the fiche which are refiled.

Positive vs negative microfiche

Discussions with the users during the design study indicated that positive fiche, rather than negative, is the more acceptable format for reading. In positive fiche the image is similar to the printed page ie black print on a white background. A small number of microfiche are only available in the negative format (eg American Chemical Society journals) but all other fiche are obtained in the positive format. Although the quality of prints produced from microfiche is largely dependent on the quality of the fiche, it is usually easier to get good prints from negative, rather than positive fiche, with prints from the positive format picking up more background dirt and dust. However it was decided that ease of reading rather than printing was the most important factor to be considered.

Microfiche equipment

Readers

Microfiche readers are positioned on nine of the users' desks in the library. The desks were chosen so as to be large enough to easily accommodate a microfiche reader. By having a relatively large number of readers available, there is virtually no possibility of a customer having to queue to use a machine, and a machine is easily accessible from all areas of the journal stock.

The model of microfiche reader chosen fulfilled the criteria listed below, which are the ones considered appropriate in our environment. Essential and desirable characteristics of microform readers are also listed in the relevant British Standard.[4]

(a) Ease of use. This is an obvious basic requirement.
(b) Low noise level. Most microfiche readers are quiet (in contrast to microfilm readers) as no winding mechanism is required.
(c) Angled screen. This gives a more natural reading position than a vertical screen.
(d) Large screen. It is sometimes more useful to be able to view adjacent pages on one screen.
(e) Front projection. This provides a suitable, uniform light intensity on the screen.
(f) Dual magnification (24x and 42x). In practice, the required journal page is always located using the lower magnification, but small print (including miniprint) and figures can be read more easily at the higher magnification.
(g) Image rotation on both lenses. This facilitates the reading of tables printed transversely and is necessary for viewing some journals which are filmed in such a way that the pages in jacketed fiche produced from the film are transverse to normal text.
(h) Clarity of image on the screen.
(i) Moderate cost.

At the time of investigations into suitable microfiche readers prior to the library move, the model chosen was the Saul LG16 FCA microfiche reader (Finlay Microfilm Ltd), currently priced at £235 for the basic model (£381 for the model with two lenses with image rotation on both). Recent comparisons of microfiche readers at one of the other Beecham Research libraries have resulted in an Agfa Copex LF 505 being selected which also fulfils many of the criteria listed above.

Reader-printers

An ideal microfiche reader-printer for our purposes would satisfy the following criteria:

(a) Reasonable, or zero, warm-up time.
(b) Relatively quick speed of printing.
(c) Dry toner rather than liquid toner (if any toner required).
(d) Cheap cost of printing. This is mainly dependent on the type of paper used, eg electrostatic.
(e) Easy to operate, unjam, maintain, etc.

At Harlow models of microfiche reader-printers were chosen to enable printing from positive fiche (the majority of holdings) and negative fiche

(ACS, BLLD, etc). Two separate machines were purchased rather than one having bimodality.

Various machines, such as the Agfa LKP and the 3M 700, are being investigated at the other libraries but the two machines used at Harlow are the Xerox 740 (current price £2,500) and the Micron (Addressomultigraph) DRP100 (current price £980). The Xerox machine is used for printing from the positive fiche. It employs normal Xerox photocopier paper and a powder toner. Although rather cumbersome and user unfriendly, this machine has proved fairly reliable to operate and produces cheap (0.3p), dry prints. Problems with dust entering the machine can result in poorer quality prints.

The Addressomultigraph machine is used for the negative fiche. It is easy to operate but has a relatively long warm-up time and uses electrostatic paper (no toner) and therefore the prints are more expensive (6.6p for 8½″ width, 8.5p for 11″ width).

Over a typical month about 800 *pages* are copied from microfiche. Of these about 300 are from negative fiche and the remainder from positive fiche. Although the majority of journals are held in positive form, some of the major holdings of chemistry journals are in negative fiche. This accounts for the surprisingly high number of copies taken from negative fiche.

In the Harlow library the microfiche reader-printers are situated in an adjacent photocopying room to keep noise in the library to a minimum. This slight geographical barrier to printing has meant that probably fewer prints are taken from microfiche than might otherwise be the case. It has been noticed that many scientists read articles using the microfiche readers and do not require a hard-copy version; others will take copies of only a specific page of experimental method, table, etc, for consultation in the laboratory. A rough estimate of the ratio of the number of *items* read to the number copied is 2:1. However, a comparison of the number of *pages* read to the number copied would result in a ratio of greater than 2:1 as not all items are fully copied.

As explained earlier it is easier to obtain good quality prints from negative rather than positive fiche. This is not considered to be a major problem because of the relatively small number of prints taken. Some difficulties are encountered when copying from photographs/half-tones in biological journals but in the rare event of the copy produced being inadequate the complete issue of the journal can be borrowed from an external source. With current developments in the market of microfiche reader-printers, many of these problems should be overcome in the near future.

User reactions

Throughout the period of transition from hard copy to microfiche holdings, the scientists were consulted and kept informed at each decision stage; eg a range of machines was examined by the potential users and their preferred machine was chosen. Positive and negative formats were discussed; the reasons behind taking the journal holdings in microform and the resultant advantages were explained, etc. Although a small number of scientists still mourn the passing of the days of solely hard-copy material, the advantages derived from the microfiche policy are appreciated by the majority. These benefits include longer journal holdings and no problems of material being absent from the library for binding. In the Spencer/Reynolds report[2] the authors state that 'it would appear that for many users a high level of motivation does much to overcome deficiencies in microforms and equipment'.

In our development of the library system we have involved the user as much as possible and have met little or no user resistance either to the detailed design study or to the actual introduction of microfiche.

The material consulted for current awareness by the scientists, ie very recent journals, is still maintained in hard copy and the differences between microfiche and hard-copy holdings have been minimised by integrating both formats at the same location in the library. Care has also been taken to try and avoid any user resistance by clear and accurate labelling of the fiche and folders to facilitate locating the article required. The scientists have adapted well to using the microfiche readers and have learnt to accept the present limitations in the printing of copies. In fact very few problems have been encountered by library staff or users in implementing the policy.

Conclusion

The experiences at the Harlow library have shown that microfiche is a suitable and quite acceptable format for use by customers when needing to refer to specific journal articles. It is not seen as a practical replacement for hard-copy journals for current-awareness scanning, browsing, etc.

The appearance of the library is attractive and aesthetically pleasing. Indeed, many visitors have remarked on it being less futuristic and extraordinary than the term 'microfiche library' might suggest.

It is important to stress the value of involving the users in decisions taken, in order to gain their acceptance of the scheme rather than create resistance. Given this acceptance, the microform policy outlined above can be realistically and efficiently implemented.

The policy described was adopted two to three years ago and was appropriate, within the state of the art, at that time. It will ensure that the Beecham Pharmaceutical Research Division libraries will not require additional storage space for ten years or so, and will ensure that the libraries have substantial journal back run holdings. The future policy for the libraries may have to change to allow for technological developments such as video discs, electronic journals, teletext, etc. However, these developments are sufficiently in the future for us to say with confidence that the policy is still valid today as a solution to the problem of the growth of space requirements in an industrial library.

ACKNOWLEDGEMENTS

The authors wish to acknowledge the contribution made by their colleagues, Mr M. S. Davies, Mrs M. Forward, Mr P. Hamilton and Mrs J. Whittall, who were involved in the making of the policy. They would especially like to

thank Mr M. J. Allen who as Unit Head, Information Services, Harlow, initiated the Harlow library design study and made a substantial contribution to all aspects of the policy.

REFERENCES

1. ABRAXAS MANAGEMENT RESEARCH. *Synectics Problem-Solving Methods.* Abraxas House, 2 Kingston Road, New Malden, Surrey.
2. SPENCER, J., *and* REYNOLDS, L. *Factors Affecting the Acceptability of Microforms as a Reading Medium.* BLRD Report 5275, 1976.
3. DUNCAN, V. L., *and* PARSONS, F. E. Use of Microfilm in an Industrial Research Library. *Special Libraries*, **61** (6), 1970, 288–90.
4. *Specification for Microform Readers.* BS 4191: 1976.

Document transfer by satellite

Bob Winfield

Department of Computer Science,
University College, London

1. Introduction

THE TERM *INFORMATION TECHNOLOGY (IT)*, has developed from the interaction and convergence of a number of 'core' technologies. It is commonly considered that there are at least three of these, namely, microelectronics, computing and communications. In particular one would wish to emphasise the special relevance of these last two technologies, particularly in view of their potential for revolutionising the way that information workers carry out their jobs.

From the beginning of the computer era, the merging of computing and communications has had a profound effect not only on the way computer systems are organised but also on the services they offer. This convergence provided the original impetus for the development of computer networks. More recently, it has seen the rise of distributed computing systems.

Communications, as with the rest of the Information Technologies, are currently in a state of flux. A casual glance at the computing press will reveal a number of developments which hold the promise of affecting the things we do with networks, as well as the way we design them.

Of particular interest are the relatively 'new' technologies of Local Area Networks (LANs), gateway devices and internetwork protocols, the availability of wide-band data links such as fibre optics and satellites. (An introduction to each of these topics can be found in refs. 1, 2 and 3.)

At the Department of Computer Science, University College London (UCL), we are currently studying the new network configurations these technologies allow us, and the services we can provide over them. This paper describes one such new network, UNIVERSE, a major experiment in satellite communication, and the transmission of multi-media documents across it.

Let us begin by considering multi-type or multi-media documents.

2. Multi-media documents

Access to remotely held information is already a commonplace to many. Online bibliographic retrieval is just one example of this. The intention of our multi-media research is to take this process one step further and show that not only whole text, but also other types of material can be accessed in the same way.

The concept of the multi-media document has essentially arisen from changes in the way we encode our information, and the newer types of

Aslib Proceedings, **36** (4), April 1984, p. 177–185. Printed in Great Britain

terminal which are becoming available to present it. The forms of information representation we employ have gone through a number of evolutionary stages. The main ones are shown below:

1 Speech
2 Writing
3 Printing
4 Digitisation

The above analysis represents a progression, implicit in which there are a number of trends. Firstly, the way we represent information seems to be moving towards a situation of decreased redundancy, ie each new encoding represents an increase in information density. Secondly, the pace of change between each of these stages seems to be increasing.

Writing and printing were the first real forms of information storage and replication. Yet in the 500 years since Gutenberg we have seen the development of a number of different 'information-based' technologies: the telegraph, telephone, photocopier and now, and perhaps most importantly, the digital computer. It is the last of the above stages, ie digitisation, when used in conjunction with computer-based technology, that is crucial to the multimedia document. It is crucial because, in principle, all information may be encoded digitally. The range of information we can already transform in this manner is shown below.

— Numbers
— Text
— Graphics
— Music
— Voice
— Sound
— Image

In digital form all these data types become amenable to storage and transmission by computer. Inside these devices, text, sound and pictures can all be presented in a uniform manner, thus enabling their editing, manipulation and combination in various complex ways, with equal facility.

Traditional print has always used both words and pictures as integrated components in documents, so what is so different now? The answer lies in the fact that with computer-based technology we can extend the range of data types in a document: thus it could include sound elements, as well as an even greater variety of visual elements.

This then is the multi-type or multi-media document, in which many data types are incorporated into an integrated, coherent single entity.

What are the sorts of applications that multi-media documents could be useful for? One can imagine a Chinese dictionary for example, with not only textual commentary, but also ideograms and dialect pronunciations of the words. Or perhaps personnel files, containing text, photographs and voice prints. The range of possibilities seems limited only by our imagination.

So what stage has our research reached?

At an early stage of our work we were able to demonstrate access to and retrieval of multi-media documents over the Public Switched Telephone Network (PSTN), and packet data networks.

The first of these networks, however, was designed specifically for voice transmission. Although there has been a rapid increase in the volume and importance of the computer data transmission over PSTN, the basic nature of the network has remained the same. Thus its major characteristics, such as limited bandwidth and a relatively high error rate, militate against applications such as multi-media document transfer. We have had better experience with packet data networks. These networks do provide higher transmission speeds—typically ten times faster than PSTN, with a corresponding reduction in error rates by a similar factor. Hence we have been able to use this type of network successfully in our multi-media work. Having said this, however, it must be pointed out that although these networks are relatively fast, as compared with the PSTN, they still suffer from speed limitations.

Therefore we have recently begun to investigate the transmission of these documents, over Project UNIVERSE, a high-performance satellite network.

3. Project UNIVERSE

The Universities Extended Ring and Satellite Experiment (UNIVERSE) has been set up by a consortium involving the British Government, industry and universities. The participants are British Telecom (BT), GEC-Marconi Research (GEC), Logica Ltd, the Rutherford and Appleton Laboratories (RAL), Cambridge University (CAMB), Loughborough University of Technology (LUT) and finally UCL.

The project is being funded by the Department of Industry, the Science and Engineering Research Council, British Telecom, GEC-Marconi and Logica. The total expenditure of the project is budgeted at three million pounds over the period 1981–4, with about 70 working-years of effort.

The aim of the project is to investigate new techniques for high-bandwidth communication between computers. In particular, we are examining and actively developing facilities to enable fast, effective communication over a concatenation of terrestrial and satellite networks. To this end a highly complex network has been developed; its general configuration is show in Fig. 1.

As can be seen from Fig. 1, UNIVERSE had some four main network components. These are:

1. Satellite system
2. Local Area Networks (LANs)
3. High-speed terrestrial links
4. Connections to X25 networks

Most obvious is the satellite system. Six of the project sites are equipped with small earth stations, each with a 3m dish. These provide a two-way link

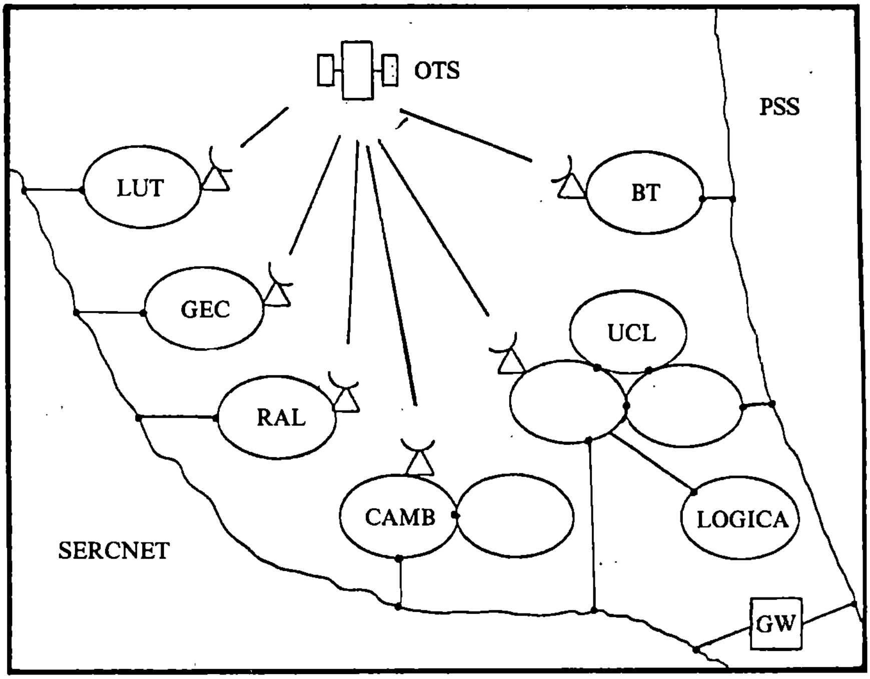


FIG. 1: *General UNIVERSE configuration*

KEY

PSS = Packet SwitchStream
BT = British Telecom
UCL = University College London
LOGICA = Logica Ltd
GW = Gateway device
CAMB = Cambridge University

SERCNET = SERC's X25 network
RAL = Rutherford and Appleton laboratories
GEC = GEC-Marconi Research
LUT = Loughborough University of Technology
OTS = Orbital Test Satellite

to the European Space Agency's Orbital Test Satellite (OTS), which is in geostationary orbit 36,000km above equatorial Africa. This link has a data rate of 1 million bits per second (Mbps).

The satellite provides UNIVERSE with high-bandwidth communication; high-speed local communication, on the other hand, being provided by LANs at each site. These are mostly based on designs developed at the University of Cambridge's Computing Laboratory, and known as the Cambridge Ring. They have a raw data rate of 10Mbps, and the capacity to carry 4Mbps of user data.

What do these raw data rates mean in real terms? In one sense they show that UNIVERSE is well suited for intermittent transmission of large documents. The data rates detailed above mean that the network can transmit something like 4 pages of facsimile or 40 pages of text a second. It should be stressed, however, that these figures do not apply to 'terminal-to-terminal'

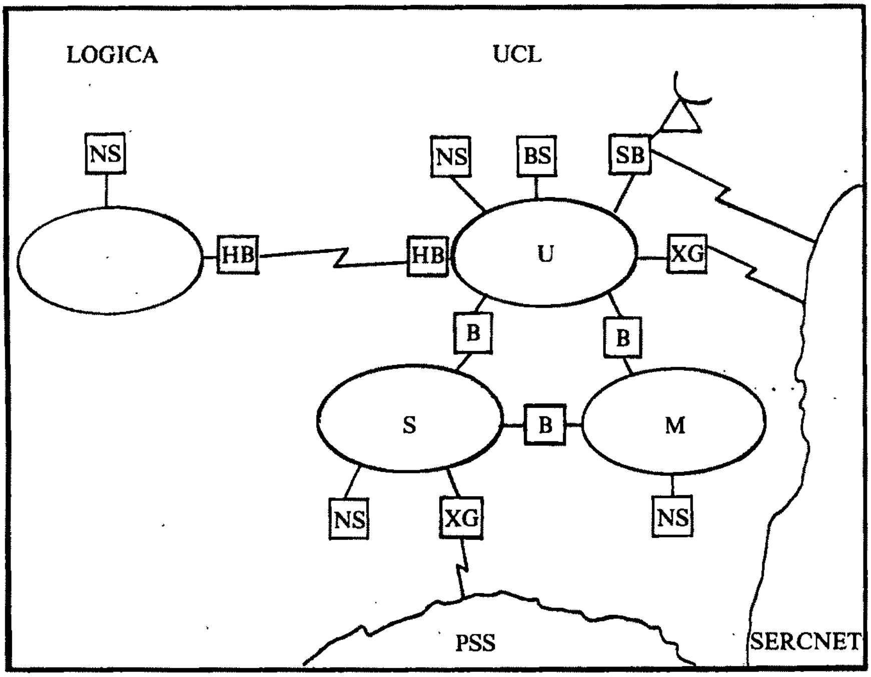


FIG. 2. *The London configuration*

KEY

NS = Nameserver
HB = Half Bridge
BS = Bootserver
SB = Satellite Bridge
XG = X25 Gateway
U = Universe Ring

B = Bridge
S = Service Ring
M = Microlab
PSS = Packet SwitchStream
SERCNET = SERC's X25 network
LOGICA = Logica Ltd

traffic. For this type of communication, data rates are much reduced, because of factors such as buffering, flow control requirements and terminal handling. Therefore, in practice, although the network is capable of extremely high data rates, subjectively the user may notice little of this.

As has already been detailed only six of the sites are equipped with earth stations. The seventh, Logica, has no dish of its own, but uses UCL's, the two sites being linked by a high-speed terrestrial link. This can be seen in Fig. 2.

Finally, to allow downline loading of software, and network connectivity, for those periods when the satellite is not available, all the sites with earth terminals are connected to an X25 network. This could be either SERC's private X25 network SERCNET, or British Telecom's PSS.

From the beginning, UNIVERSE was faced with the problem of joining these disparate networks' components into a coherent single system. This function is provided by a number of devices known variously as gateways or bridges. Again, there are four main types of bridge in use within the project, and these are also shown in Fig. 2. At the lowest level we have a bridge (B) to connect the Cambridge Rings together. Secondly, the Cambridge Rings are connected to the earth terminal by what is known as a satellite bridge (SB). X25 connections to either SERCNET or PSS, are provided by an X25 gateway (XG). Lastly, and currently unique within the project, there is a terrestrial Half Bridge (HB), connecting Logica and UCL.

This then in outline is the structure of the UNIVERSE network. How then have we been using it in our multi-media work?

4. UNIVERSE and document retrieval

Other work carried out by UCL into multi-media electronic mail systems, this time within the framework of the American ARPANET community, seems to indicate that the manipulation, storage and transmission of multi-media documents will require substantial computing resources.

Simple access to these documents, once they have been created, however, need not require resources on such a scale. Our work within UNIVERSE therefore, has concentrated on the development of a new form of multi-media workstation, based on a cheap and readily available microcomputer.

The system we have chosen is the BBC microcomputer. Based on the 6502 microprocessor, it offers a flexible and comparatively sophisticated system at a low cost. The micro comes with a standard 80-column text display, but in addition offers a number of other displays. These range from a full colour videotex mode to high-resolution bit-mapped displays. Of further interest is the integral speaker system and optional voice synthesis unit. Future upgrades to the system, including 8-bit and 16-bit back-end processors, are promised.

Using the BBC micro we have created a number of multi-media documents. These are of a relatively simple type as we have restricted ourselves to a subset of the data types available to us. Our documents therefore consist of text and a combination of low-resolution and high-resolution graphics.

We access these documents via our multi-media workstation. This is a distributed system, consisting of two BBC micros, linked via a Cambridge Ring, to form a dual-screen terminal. On one screen we display the text segment of our documents, the graphics component being piped to the second. In addition we have the option of obtaining a hard-copy printout of any material we display, through the use of a colour ink-jet printer, by connecting a third BBC micro to the system to act as a printserver. This system configuration is shown in Fig. 3.

Our small database of multi-media documents is stored on a number of fileservers at remote sites within UNIVERSE. The documents are retrieved by a user sitting at the workstation and interacting with a simple interface. This latter is 'menu-driven' and has various command levels. The interface guides the user in selecting a document, choosing a remote site to access, looking at a specific page or diagram within the document and so on.

The user reads a multi-media document much as one would a conventional

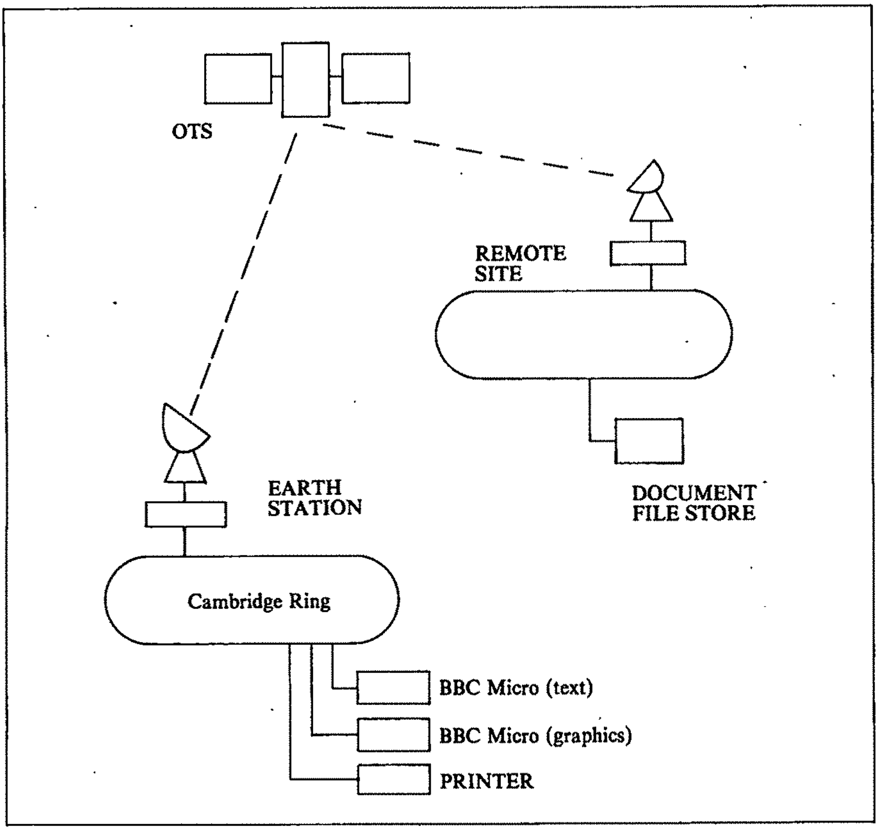


FIG. 3. *The UNIVERSE multi-media experiment*

article. Using the interface the user simply 'pages' through it, the system fetching each screenful transparently across the network and displaying it. The only difference is that within each page of text there may be explicit references or pointers to one of the document's graphics elements, just as with this paper there may be references to an accompanying diagram or figure. When the system comes across such a reference it will fetch the relevant graphics screen from a remote filestore and display it on the second BBC micro.

The system described above was developed and implemented in a relatively short period of time. It has now been in existence for some months. Although we still have a long way to go before we can provide a fully functional retrieval service using multi-media documents, a number of useful lessons have been learned. Chief amongst these is that it is possible to transfer multi-media documents across networks such as UNIVERSE. In fact, the high bandwidth of such networks makes them eminently suitable communication channels for this type of application. Thus UNIVERSE allows us to start thinking about more complex forms of multi-media documents. These can have a greater variety of data types, such as facsimile or even large scale bit-map images. Previously these forms of data type were denied us, due to the relatively limited bandwidth of the networks we were using.

Early experience also seems to indicate that it is possible to use cheap microcomputers to interface to expensive, complex networks. Any performance restraints on the part of our workstation seem to be offset by UNIVERSE's high bandwidth communication channels.

5. Conclusion

Our work has shown that relatively cheap microcomputers can be used to front-end expensive high-performance networks such as UNIVERSE. The ready availability of such low-cost access mechanisms is likely to stimulate a demand, in the near future, for access to online information, which is presented in quite different ways to conventional text. Prestel, and the other viewdata systems, represent simply one aspect of this trend.

In the past, applications such as multi-media document transfer were not really feasible, since we were restricted to using traditional communication systems, such as those based on the PSTN. This situation is, however, slowly beginning to change.

System X may still not be with us, but British Telecom is already providing a number of commercially available digital services under the general title of X-Stream. This includes not only PSS (or, as it is now known, Packet SwitchStream) but also KiloStream, MegaStream and, from 1984, its commercial satellite service. SatStream. These types of network will be important. Once we can digitise data structures, they can be combined into multi-media documents, and transferred uniformly, at high speeds through a network. Control information or data, will appear exactly the same to the network, ie as a stream of digital bits.

Within the UNIVERSE project, we have been working on relatively simple forms of multi-media documents. But with both cheaper access mechanisms and these 'new' types of network becoming more widely available, more sophisticated forms will inevitably follow. The emergence of these new networks is the motivation for UCL's ongoing research into the implementation and evaluation of this type of facility—one which we feel will have important implications for the provision of future information systems.

ACKNOWLEDGEMENTS

Project UNIVERSE involves over 30 people directly, and many more indirectly. It has been built on much of the satellite access technology developed in the earlier STELLA experiment and on the Cambridge Ring technology developed at Cambridge University. Financial support for the project is being provided by the Science and Engineering Research Council, the Department of Trade and Industry, British Telecom, GEC-Marconi, and Logica. In addition much of our multi-media research has been funded by the British Library and we would like to acknowledge their generous support.

REFERENCES

1. GEE, K. *Local Area Networks.* Manchester: National Computing Centre, 1982.
2. HIGGINSON, P., *and* COLE, R. Issues in Interconnecting Local and Wide Area Networks. *Proceedings of the Business Telecom Conference.* London: Online, May 1983.
3. WEITZMAN, C. *Distributed Micro-Minicomputer Systems.* Englewood Cliffs, NJ: Prentice-Hall, 1980.

NEW

Creating an information service

Sylvia P Webb

Setting up an information service, often with little assistance from support staff, can be a daunting task. Recognising this problem, Sylvia Webb has written a practical guide which provides a step by step approach to the tasks involved.

9 checklists enable users to plan an information service most appropriate to their own needs. 4 appendices indicate:

* whom to approach for information
* organisations offering short courses in information work
* suppliers of books, journals and library equipment

ISBN 0 85142 186 5 UK £9.00 (£8.00 Aslib members) Overseas £11.00 (£9.50 Aslib members)

The Association for Information Management

Aslib 3 Belgrave Square
London SW1X 8PL
telephone 01-235 5050 telex 23667

Word processing in information services

Penelope A. Yates-Mercer
Department of Information Science
The City University, London

Ailsa A.S. Bracegirdle
Industry Centre,
University College, Cardiff

1. Introduction

SCREEN-BASED WORD PROCESSORS have been available all through the 1970s, although widespread interest and use dates from about 1975. Conventional offices, generating and manipulating many thousands of words, started to take advantage of the features word processors offer on a much wider scale than they had ever done with their forerunners, the automatic typewriters. Libraries and information departments who were concerned primarily with the already printed and published word were rather slower to realise that they too generated a relatively large number of words in their own right and that these words, in the form of, for example, catalogue cards, accessions lists, abstracts, bibliographies, reports and so on, could perhaps be handled more beneficially by word processors. However, once it began, interest grew rapidly, although actual installation of equipment has been considerably slower—probably a reflection of the limited budgets frequently allocated to such services for the purchase of technological aids.

There are many published descriptions of word processors (eg, Whitehead[1,2], Armstrong *et al*[3], Simons[4]), some of which include specific examples of applications. Also some users have described their own applications (eg, Dubois and Barron[5], Haines[6], Whitsed[7], Williams[8]). The British Library Research and Development Department[9] has shown considerable interest and the National Reprographic Centre for documentation[10, 11] has both surveyed users and carried out its own research. Again, other authors (eg, Clough[12] and Edwards[13]) have discussed their potential in the information environment.

More recently, microcomputers have become widely used in all types of organisations, especially smaller organisations with less money to spend on hardware. Users have felt the need for their machine to be able to process words as well as numbers, and word processing packages have been developed to meet this need. Some word processing packages, or software packages incorporating word processing facilities, have been available for use on mainframe and minicomputers although these have tended to offer less sophisticated facilities than dedicated 'word processors', especially for those organisations that could afford both. Today microcomputers with word processing packages offer to small organisations both number-crunching and

Aslib Proceedings, **36** (4), April 1984, p. 187–198. Printed in Great Britain.

word-crunching facilities comparable in concept if not in sophistication to those available to medium and large organisations. Actually it is not the size of the overall organisation that is the critical factor, but rather the availability to the unit concerned of money to spend on machines and equipment.

The present situation can be generalised as one where the main options available are either a dedicated word processor (either stand-alone or shared resource system) or a microcomputer with a word processing package. The relative cheapness of the latter option has led to a stabilisation and in some cases decrease in the cost of dedicated word processors, especially the stand-alone system with which they are in more direct competition. One of the purposes of the present investigation[14] was to assess the relative adoption of these alternatives by information services. (Throughout this paper the term 'information services' is used to include both libraries and information departments.)

A problem confronting any potential user of word processing, but more particularly the first-time user, is the wide choice of systems available. Many features are standard to most systems, although some systems offer special features which may or may not be of particular interest to information services, for example, the ability to handle mathematical symbols, chemical notations, foreign language characters, etc. With over one hundred dedicated systems and a similar number of software packages to choose from, is there any indication that information services have tended to choose particular systems as being well suited to the requirements of information work? Seeking an answer to this question was another purpose of the present investigation.

The third main purpose was to ascertain what tasks information services are actually using word processing for. A previous survey by NRCd[3] has listed some uses and it is relatively easy to speculate about such things; however, hypothesis and practice often differ considerably for many reasons. Thus this study is not concerned with the detail of specific applications, but rather with a general overview of types of applications and their frequency.

2. Methodology

The present investigation was constrained by time, money, and geographical accessibility, and hence it was decided that a postal questionnaire was the most appropriate technique, despite the well-known disadvantages of such an approach. It contained fifteen questions in six sections, covered two pages, and was accompanied by an addressed reply envelope. Thus it was hoped to minimise the burden on recipients and encourage replies. The questionnaire is reproduced as Appendix 1.

Sixty copies of the questionnaire were dispatched in July 1982. The sample was compiled by reference to a published list of microcomputer users[15], from authors of published papers, personal contacts, known users and potential users, etc. There was no attempt to reflect a cross-section of information services; the object was to reach users of word processing systems in information services in order to gain as much information as possible regarding their experiences.

By the end of September 1982, forty-two replies had been received, a response rate of 70 per cent. Of these, nine respondents were not in fact using word processing and two were using remote systems of which they could supply no details other than the uses to which the systems were put. Therefore, of the replies received, eleven were mainly unusable for the purpose of analysing the returns. The effective response rate was thus reduced to 52 per cent. The distribution of the sample and response is shown in Fig. 1. The sample and the response were fairly evenly divided between private industry and others. The answers to each question were analysed and the results are discussed below.

Type of organisation	**Type of equipment used**			**Questionnaires returned**
	Dedicated	Package	None	(number sent in brackets)
Universities	0	2	0	2 (5)
Polytechnics/colleges	1	3	0	3 (5)
Public libraries	1	0	1	2 (2)
Hospitals	0	1	1	2 (4)
Government departments	1	1	2	4 (4)
Research/trade associations	2	3	0	5 (7)
Nationalised industry	1	1	1	2 (4)
Private industry				
chemicals	3	1	1	5 (5)
oil	3	1	3	7 (7)
pharmaceuticals	3	1	0	3 (7)
others	2	3	2	7 (10)
TOTALS	17*	17*	11	42 (60)

*3 respondents using both dedicated and packages

FIG. 1. *Distribution of response showing type of equipment used*

3. Questionnaire results

3.1 Systems in use

The respondents were equally divided between dedicated word processing and package systems, although three were using both. More of the dedicated systems were used in private industry and more of the packages were used in the public sector.

Of the dedicated systems, Wang was the most popular supplier, followed equally by AES, Wordplex, Vydec, and Rank Xerox. This result is similar to that of Singleton[16], who combined AES and Wordplex (now separate companies) to give them a slight lead over Wang and Vydec.

A wide range of packages was in use, the most popular being Wordstar and Wordskil. Wordstar is designed to run on any CP/M-based microcomputer and this versatility possibly accounts for its popularity. Two respondents were using CAIRS, an information retrieval package with word processing facilities, and another two respondents were using their word processing packages linked to ASSASSIN.

Ten of the seventeen repondents using packages were using them on microcomputers, three using them on minicomputers and four on mainframes. Of the microcomputers in use, the Commodore Pet was the most popular (40 per cent of users), again a similar result to that of Singleton[16]. This may be attributable to the low cost and aggressive marketing of this machine, coupled with the fact that several packages, such as Silicon Office, Simply Write, Superscript, Wordcraft, and Word Pro 4, can run on it.

The use of dedicated systems, packages and microcomputers are all shown diagrammatically in Fig. 2.

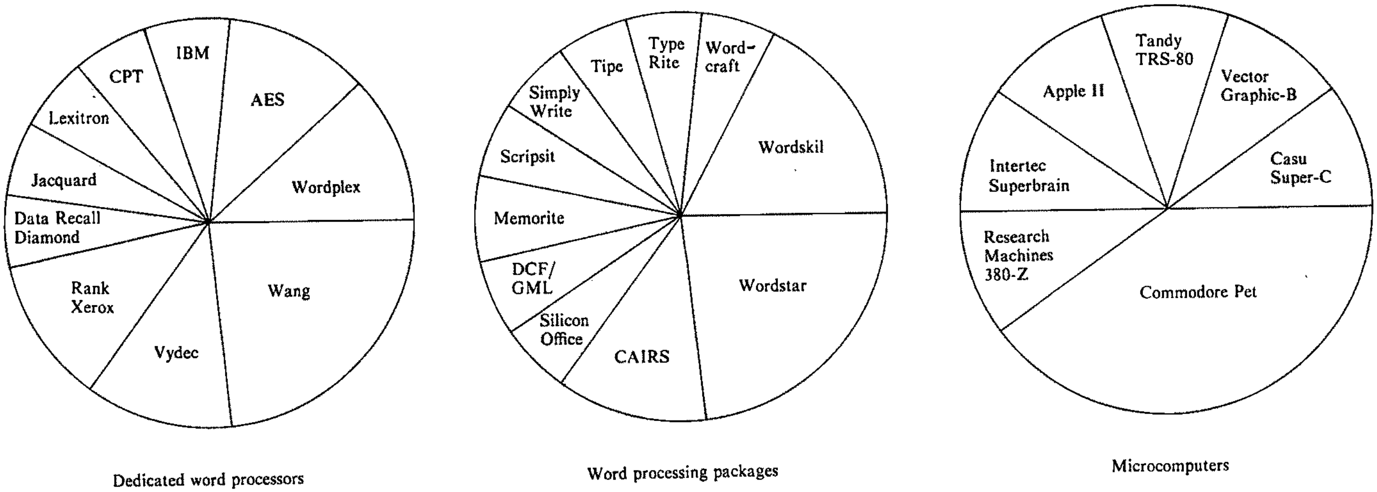
Users were also asked about the date of installation of their system. Dedicated systems have been installed mostly since 1978, the peak being 1980. In contrast, packages were not adopted until 1979, and their use is continuing to grow. This trend is clearly shown in Fig. 3. Coupling this with the distribution between the public and private sectors, one might infer that generally private industry has been using word processing facilities for longer than the public sector.

Package users were asked about the other uses of their computer systems. Not surprisingly mainframe computers were also used for general company business. A variety of other uses was described by respondents using packages on minis and micros, the most commonly mentioned applications being calculations, information retrieval (including assisting online searching), data processing and user programming.

Over one-third of the respondents gave organisational policy to deal with a certain manufacturer or supplier as the reason for the choice of the system in use. All these were in private industry. Compatibility with other equipment on site was also frequently mentioned, the majority of respondents in this case being from the public sector. It may also however be the case that the reason for the private sector organisation policy, as referred to above, was to ensure compatibility.

Those with dedicated systems were concerned with the ability to expand those systems in the future. Those using packages were apparently influenced by the cheapness of the package plus a microcomputer, compared with a dedicated system, and some people had chosen a package because it was the only or best one designed to run on the computing facilities already available.

No respondent mentioned any particular feature of a system which had led them to acquire it, other than the ability to extend it in the future or to link it to other equipment. It is not possible to conclude from these results that any one make or model is especially noted for its suitability to the needs of information services.



Dedicated word processors

Word processing packages

Microcomputers

FIG. 2. *The use of dedicated word processors, word processing packages and microcomputers in libraries and information departments*

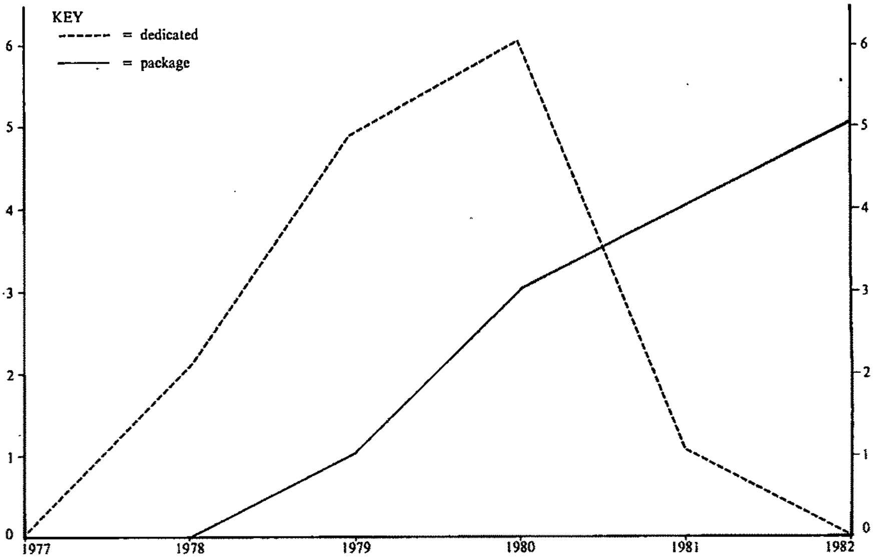


FIG. 3. *Number of new installations of dedicated word processors compared to word processing packages*

3.2 Uses of word processing

The questionnaire listed fourteen applications of word processing and asked respondents to specify other uses. The listed applications were chosen as being those most commonly mentioned in the literature, and the results tended to confirm that this was the case in practice. This agrees with the findings of Painter[3, 10] and Whitehead[1, 17], but perhaps disagrees with those of Singleton[16], although terminological differences may be involved in Singleton's case.

Report writing and editing were clearly the most frequently occurring applications, followed by correspondence and current awareness bulletins, then database creation and maintenance, and catalogue entries. Mailing-list creation and standard letters were additionally listed by three users each, although it is possible that other users included these under the heading of correspondence. The frequency of uses is shown in Fig. 4.

Other applications added by one user each were: bibliographies, events calendar, manuals, output to COM, output to phototypesetting, patent specifications, publications lists, society subscriptions, statistical information, teaching purposes, and teletype for BLLD requests.

Thus, although the systems used may vary considerably, there seems to be a relatively high degree of commonality regarding the applications to which the systems are put. These results, together with those of other authors, indicate that there is indeed a considerable number of tasks within information services to which this particular technological aid can usefully contribute.

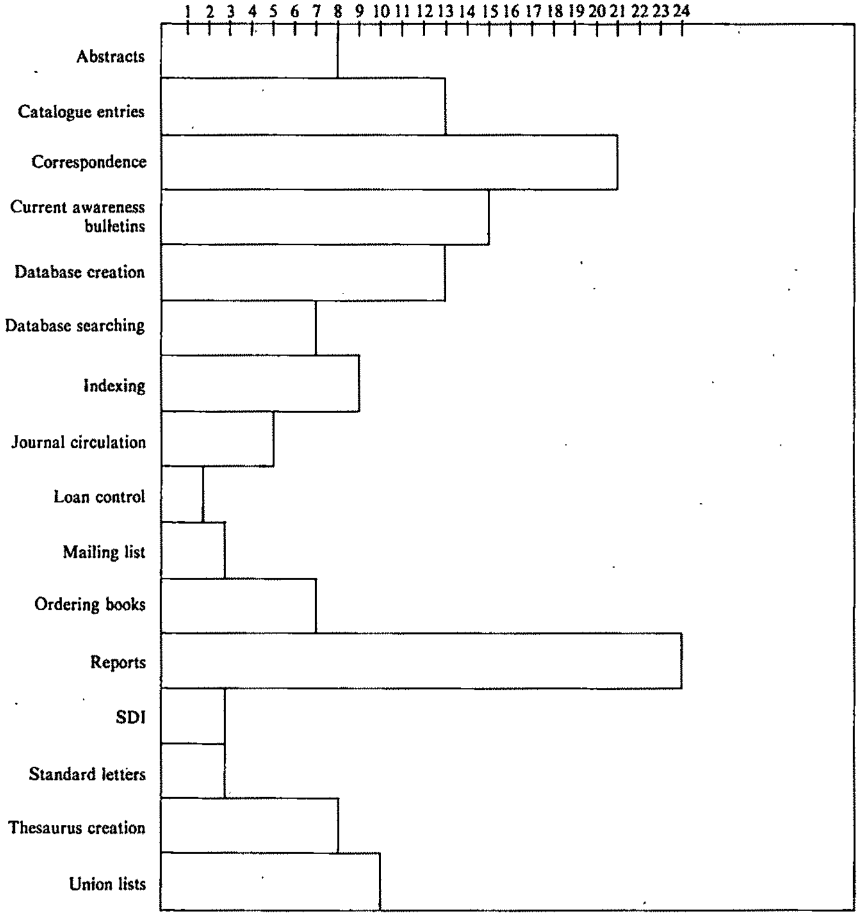


FIG. 4. *Uses of word processing in libraries and information departments*

3.3 Ancillary aspects

The rest of the questionnaire was devoted to questions of a more general nature to provide some background information on the installations.

With regard to the factors that led to the acquisition of word processing facilities, the majority of respondents mentioned that they were frequently updating and editing material such as reports, and doing repetitive typing. In view of the uses of word processing discussed in the previous subsection, this is not surprising. Several others explained that they had not made a specific request for a word processor, but had been taken into account in the overall planning of an automation scheme for their companies. Others replied that there was a need for better quality output and faster turnover of work, or that word processors had been selected when replacing obsolete equipment, or when restrictions were placed on clerical staff recruitment.

Location and access to equipment were also queried. Half of the respondents had the word processor within the information service, although two-thirds of these had packages and only one-third dedicated machines. If not housed within the information service, the system was usually in either a general office or computer room.

Twelve of the dedicated systems were shared with other departments, only five being exclusively for the use of the information service. In contrast nine of the package-based installations were used only by the information service, and eight were also used by other departments. Where the system was shared, the proportion of use by the information service varied widely, irrespective of whether the system was located in the information service or elsewhere. Therefore it would seem that proximity to and control over a shared system is not related to use, and perhaps other organisational factors predominate.

Users were asked if there were functions of the system which were not used. Twenty-five respondents either claimed to be using all available functions or were unaware whether there were unused functions. It would be unwise to conclude that the majority of users are using their systems to their full potential as the replies may have been made in ignorance of the total facilities available. However, a small number of users admitted to not using mathematics/calculator functions, spelling verification, mail-merge facility and user programming.

The questions of the fourth section were perhaps edging towards areas involving subjective judgements by the respondents and their answers should be treated accordingly. Twenty-one respondents claimed there had been no effect on staffing, and eight claimed a reduced level of staffing overall or an increase/reorganisation of workload. One user of a centralised service reported a loss of local typing services, leading to a reduction in clerical staff with the secondary effect that graduate staff were having to take over more clerical duties, such as filing.

Related to this aspect was the question about whether or not more text editing was being done due to the presence of the word processor. It has been suggested that some of the benefits of word processing are being eroded by authors requiring more revisions and drafts of documents than with traditional methods. Twenty-four respondents thought that more text editing was being done, but the question as worded was unfortunately rather ambiguous and this aspect would really require a more detailed objective analysis. This in turn would presuppose that users had monitored workflow before and after installation.

There is in general some tendency for organisations to install mechanised equipment mainly for one application and subsequently find that there are other tasks that it can usefully perform as well. In this investigation nineteen respondents said that they made no use of the word processor other than for the original intended uses and three could not answer because they were unaware of the original aims. Only nine respondents claimed to have found additional uses, such as indexing files which would otherwise have been held manually, using a package to sort items alphabetically, constructing an in-house database, using the word processor as an aid to online retrieval, and also as an aid to uniformity of title pages of internal reports.

The general word processing literature has tended to feature some frequently claimed disadvantages of such systems, for example, health hazards and eye strain, staff resistance, and incompatibility with other equipment. There are also some human characteristics relative to system implementation, one of which is not to admit, in public at least, to any fault with a system one has installed, and another is to decry any change or progress, especially if it involves new technology. The responses to the question concerning disadvantages of word processing are therefore interesting, but open to several possible interpretations.

Seventeen respondents said they had found no disadvantages. Of those experienced by the other respondents, the most common was incompatibility with other equipment, followed by limited storage capacity, machine breakdowns (more common with package than dedicated systems), and obsolescence of equipment (more frequent with dedicated than package systems and probably related to the date of installation). Some other disadvantages mentioned were: inability to print on to cards without a special feed mechanism costing £1,500, poor print quality, single disk drive, and small size of screen. All of these can be regarded as limitations of particular systems, rather than disadvantages of word processing in general. Another problem mentioned was remoteness from a centralised facility, but this is an organisational factor rather than a system factor. Although suggested by the question as posed, no respondents admitted to problems with either health hazards or staff resistance. There are several possible explanations for this, including the fact that some respondents actually had very low usage of their system and in some cases the input was performed by staff from other departments.

4. Conclusions

From a small survey of information services using word processing, the conclusions drawn must be relatively general. A postal questionnaire has disadvantages, especially in this case, where it was decided to restrict its length in the hope of obtaining optimum response. There were several aspects which would have been interesting to follow up in greater depth, but other project constraints precluded this. However it is felt that satisfactory answers were obtained to the three main questions posed.

A relatively wide range of systems and equipment is in use by information services, with no single system standing out as the preferred choice. This is obviously due, in part at least, to the fact that choice of equipment is governed by company policy, compatibility with other equipment on site, etc. Also the majority of users, especially those with dedicated word processing systems, share the equipment with other sections in the organisation, and only half the respondents have the equipment located within the information service.

The general growth in the use of microcomputers with word processing packages at the expense of dedicated word processors is reflected in the situation in information services. The respondents were equally divided, although three users had both types of system available. The dedicated word processors predominate in the private sector and were generally installed earlier. In the public sector there are more microcomputers with packages which had been more recently installed and there is a clear indication that this is the growth area. Wordstar, a CP/M-based package, is the most used, but the Commodore Pet, for which several word processing packages have been designed, is the most widely adopted microcomputer.

In contrast to the wide range of systems, the uses to which they are put are much more standardised, despite the wide range of organisational backgrounds included in the survey. The most popular applications are report writing and editing, correspondence, production of current awareness bulletins, database creation, and production of catalogue entries. In addition to these main applications, there is quite a wide range of tasks to which word processing is also put, although by a more limited number of users.

In view of the amount of discussion about health and safety aspects of working with visual display units, it is worth noting that neither this nor staff resistance were mentioned as disadvantages of word processing. There are several possible explanations for this response, one of which is that in some information services replying to the questionnaire the usage factor is quite low, or again that the actual input was not done by information service staff and hence the person completing the questionnaire may have been unaware of any such feelings. Most of the disadvantages mentioned were related to the particular system in use or to organisational factors, rather than to word processing in general.

The widespread interest in word processing and related technological hardware, coupled with changes in information services and the environments in which they operate, implies that the information community in general should continue to keep abreast of developments and explore their applications both by general surveys such as this one, and by in-depth investigations.

REFERENCES

1. WHITEHEAD, J.B. Developments in word processing systems and their application to information needs. *Aslib Proceedings,* **32** (3), March 1980, 118–33.
2. WHITEHEAD, J.B. Word processing and information management. *Aslib Proceedings,* **33** (9), September 1981, 325–42.
3. ARMSTRONG, C.J., GUY, R.F., *and* PAINTER, J.D. Microcomputers or word processors in the library? *Reprographics Quarterly,* **14** (3), Summer 1981, 98–103.
4. SIMONS, G.L. *Introducing word processing.* Manchester: NCC Publications, 1981.
5. DUBOIS, C.P.R. *and* BARRON, J.L. Full word processing and mainframe integration: an information management application in a multi-task environment. *Information Services and Use,* **1** (5), 1982, 291–305.
6. HAINES, M. Information retrieval on a Texxetta word processor. *Inform,* No. 30, January-February 1980, 10.
7. WHITSED, N. Reflections on word processing: the experience of a small medical library. *Aslib Proceedings,* **34** (9), September 1982, 415–19.
8. WILLIAMS, R.T. *The library and the word processor: a case study.* Shrewsbury: Shropshire Libraries Occasional Publication No. 2, 1981.

9. BRITISH LIBRARY. Word processing activities. *Research and Development Newsletter*, No. 22, January 1981, 3–4.
10. PAINTER, J.D. NRCd, word processors and the information industry. *Aslib Proceedings*, **34** (9), September 1982, 406–14.
11. MERALI, Z. Word processing output microform: after COM can word processor/micro-/mini-computer output microform take off? *Reprographics Quarterly*, **15** (1), 1981/2, 17–20.
12. CLOUGH, R. New technology – new opportunity. *4th International Online Information Meeting, London 9–11 December 1980*. Oxford: Learned Information (Europe) Ltd, 1981, 245–53.
13. EDWARDS, K. Word processing. *In* ANTHONY, L. J. *Microprocessors and intelligence*. London: Aslib, 1980, 15–21.
14. BRACEGIRDLE, A.A.S. Word processing in libraries and information departments. London: The City University, M.Sc. dissertation, 1982.
15. BURTON, P.F. *Microcomputer applications in libraries and information retrieval: a directory of users*. Edinburgh: Leith Nautical College, 1981.
16. SINGLETON, A. Microforms and word processing in libraries and information centres: a report on a survey. *Reprographics Quarterly*, **15** (3), September 1982, 406–14.
17. WHITEHEAD, J.B. Word processing: an introduction and appraisal. *Journal of Documentation*, **36** (4), December 1980, 313–41.

APPENDIX 1

SURVEY OF USE OF WORD PROCESSING IN LIBRARIES/INFORMATION DEPARTMENTS

1. (a) Do you use a dedicated word processor ? YES / NO

If YES what make and model, and what is its approximate purchase cost and approximate date of installation ?

Make ....

Model ....

Cost ....

Date ....

(b) Do you use a word processing software package ? YES / NO

If YES which package ? ....

Please state whether it runs on a mainframe, a mini, or a micro ....

Make ....

Model ....

Date ....

(c) If you use a package, to what other uses is your computer put ?
[Please specify] ....

....

(d) What were your reasons for selecting the type of word processing equipment and model that you have ? ....

....

....

2. What are the uses of the word processor in your department ? [Please tick]

abstracts
catalogue entries
correspondence
current awareness bulletins
database creation & maintenance
database searching
indexing
journal circulation
loan control & statistics
ordering of books etc.
report writing & editing

S.D.I.
thesaurus creation
union lists

other [please specify]
....
....
....
....
....
....

APPENDIX 1 (contd.)

3. (a) Which factors led you to acquire a word processor ? [Please specify]
....
....

(b) In which department is the word processor housed ? ....

(c) Is the word processor used by departments besides your own ? YES / NO
If YES how much use is by your own department ? ......%

(d) Are there any of its functions which you do not use ? YES / NO
If YES please specify ....
....

4. (a) Has your staffing been affected by the introduction of word processing? YES/NO
If YES please specify ....
....

(b) Is more text editing being done due to the presence of the word processor? YES/NO

(c) Have you used it for work which you did not originally intend to do ? YES / NO
If YES please specify ....
....

(d) Have you found any disadvantages to your word processor ? YES / NO
If YES please tick.

health hazards
incompatability with other equipment
limited storage capacity
machine breakdowns
obsolescence of equipment

staff resistance

other [please specify]
....
....

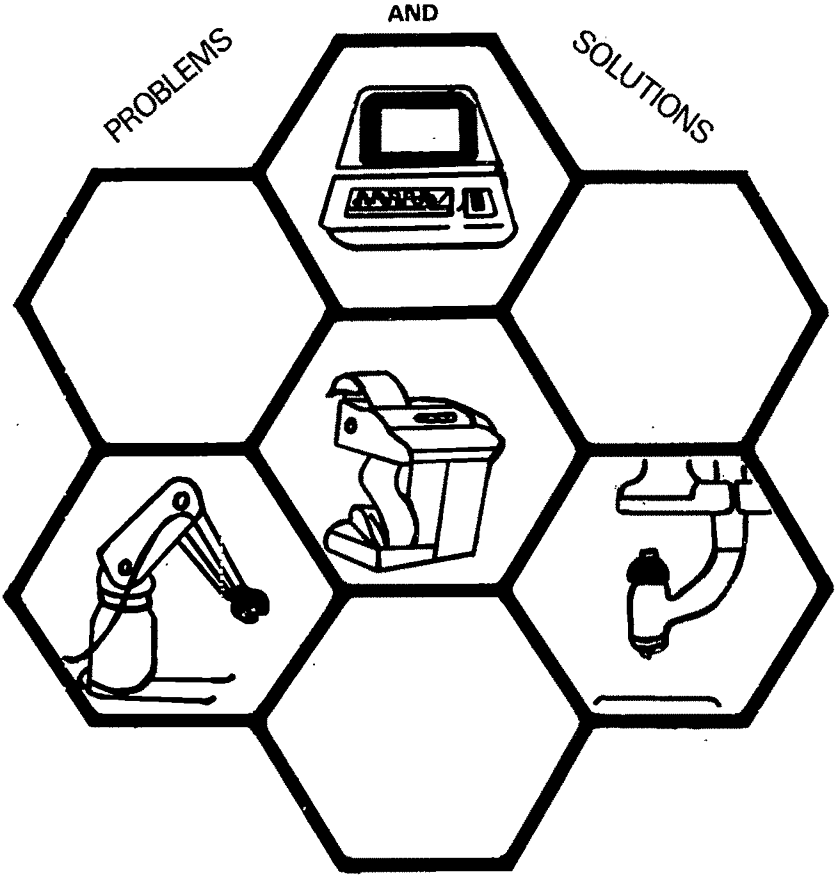
5. May your organisation be mentioned by name in the thesis ? YES / NO

6. Any other comments regarding your experiences with word processing in your library/information department would be welcomed.

Thank you.

Please return as soon as possible to Mrs. A. Bracegirdle, Technical Information Officer, C.U.I.C., 51 Park Place, Cardiff.

Information Requirements for Advanced Engineering Technology problems and solutions



A one-day conference
at Coventry (Lanchester) Polytechnic
Thursday, 3 May 1984

Organised by the Coventry (Lanchester) Polytechnic
in conjunction with
Aslib Midlands Branch and Aslib Engineering Group

For further details contact Carolyn Hall
Coventry (0203) 24166 ext. 7606

Problems at work

Margaret Slater
Aslib Research and Consultancy

'WHAT ASPECTS of your job present the most difficulty?' Answers to this question, involving graphic and sometimes disturbing descriptions of the problems and constraints of working life, were provided by samples of chemists, engineers and insurance personnel during 1981. The information was collected as background material, while investigating an apparently different but actually related topic. Results and subsequent speculations seemed, however, to make it worth excising this fairly self-contained body of data on impedances to effective job performance and presenting it in isolation. Apart from light thrown on the wider subject of the original enquiry, the exercise may be useful in its own right to anyone concerned with studying or improving the nature, quality and productivity of working life. Managers, personnel and training officers, sociologists and industrial psychologists may therefore find it interesting.

The official scope of the parent survey was the provision, usage, evaluation and image of a particular type of support facility at the workplace. The resource concerned was information and document supply, as back-up to professional workers. Our interest was by no means exclusively confined to, but tended deliberately to focus on, the role of the conventional staffed library-information service at the workplace. In this formally defined context, the research was concerned with non-use and sub-optimal usage as phenomena and with their causes.[1]

Library-information services are provided by some (but by no means all) employers at some places of work as presumed aids to work. Amongst comparable possible users of such facilities it is noticeable that some use them heavily, others moderately or lightly, and others not at all. Ignoring frequency of usage and concentrating on its nature and purpose, under-utilisation of system potential can also be observed. Traffic may seem fairly brisk, for instance, but the usage it represents may not exploit available provision (particularly staff expertise) to the fullest extent or even very sensibly. Both non-use and misuse amount to wastage of organisational resources and funds.

For these reasons, it seemed advisable to include within the total research plan some exploration of the respondent's working life and the typical problems encountered within it. Does the kind of support provided by and the definition and perception of 'user needs' accepted by industrial-commercial library-information services correlate with the potential users' view of the real problems and demands of their jobs? The professional literature of the library-information field, especially the sector reporting typical 'user studies', would seem to indicate that information needs tend to

Aslib Proceedings, **36** (4), April 1984, p. 201–212. Printed in Great Britain

be defined in a subject, discipline, or occasionally industry oriented mode. Similarly, user problems are often narrowly interpreted as having to do with published information, its identification, location and acquisition.

In the light of our findings about how professional people (potential users) see their real problems at work, taking into account the current vulnerability of any service department without a visible product or profit to justify its existence in these cost-conscious times and the traditional marginal status of library-information services within organisations, one wonders whether library-information departments should not consider reinterpreting and broadening their remit of service. Incidentally, that statement and the evidence on which it is based may be relevant to other service functions. It would be only fair to add that service professions and occupations may not be totally unaware of or unreceptive to the idea of role and goal redefinition. It is possibly significant that the field leader (in prestige and visibility) of the service professions, medicine, appears to be making some serious attempts to expand its traditional parameters. Indicative of this trend is investigation of such concepts as: the 'whole person' approach to treatment of the patient; preventative medicine; alternative medicine and unorthodox methodology.

Perhaps, in the context of library-information services, the basic question put by a user study should be, not 'what problems do you have in trying to obtain information and documents?', but 'what problems do you have in trying to do your job?' Similarly, the pertinent question put by library-information heads to higher management might profitably be 'what are your organisational goals and forward plans?' Resulting data, if skilfully interpreted and acted upon, could put services on a holistic (whole person and whole organisation) basis. Currently, the concept of the organisation served and of the human network of individuals operating within it, held by many librarians and information workers, seems perilously close to an artificial construct, involving a 'flatland', if not unidimensional view of surrounding reality. In other words, information services themselves may be under-informed (or behaving as if they were in this state). This situation represents a poor basis for service or survival. Closer integration of the library-information unit into the fabric of working life would surely increase its survival potential.

Apart from self-interest, to what extent would such attempts be justified or worthwhile? What is the size and shape of the situation under discussion? Do a significant number of people encounter 'problems at work', or is this experience a minority affliction? What kind of difficulties are we talking about anyway? Do they sound serious, or more like petty 'facts of working life', disturbing to none but those prone to anxiety neurosis? Can patterns be discerned? Can one classify the problems and trace trends? Do, for instance, identifiable groups of people have different kinds of difficulty, or different patterns of problem incidence or distribution? If so, this might be indicative of a need for different kinds of support service to alleviate problems or assist in coping with them.

Let us now attempt to address these questions to the survey data. Taking first the simple question of problem incidence, it would seem that this may be widespread at a high level of occurrence. Amongst our sample as a whole, 82 per cent said that they did have problems at work and only 18 per cent felt relatively problem free. Levels did not vary significantly amongst the subgroups of the sample. In fact, they were remarkably close, percentage range being 80–84 per cent. No discrete categories of respondents felt better or worse off in this respect. Problem incidence was therefore uniformly high, constituting a general hazard to well-being and efficiency at work and being no respecter of persons, job titles or specialisations. In view of the wider aims of the survey, it was interesting to note that possession and usage of formal library-information facilities made absolutely no difference to the level of problem incidence. This depressing finding would tend to reinforce the argument put forward earlier, that for proper fulfilment of its avowed service function and ethos and for its own professional survival, the individual library-information unit might be well advised to connect more directly with the working life and problems of its potential patrons.

What about the nature of problems experienced by respondents: what factors acted as agents of interference? What aspects and elements of the occupational and organisational role were (perhaps unnecessarily) difficult? As is often the case when dealing with open-ended verbatim material, a dual approach to category analysis proved possible, informative and rewarding. Problems could be identified and examined on two levels of specificity: broad brush, drawing allied problems together under a wide area heading; detailed, separating out the discrete individual problem types mentioned.

Using the generic approach, four basic problem areas emerged from answers. Corporate management was cited (in one form or another) by 28 per cent of all respondents, interpersonal relations at work by 39 per cent, internal problems concerning one's own competence and expertise by 44 per cent, information-related difficulties by 45 per cent. Without the finer detail of the minor patterns of problems occurring within each of these larger areas, this data may be interesting, but its practical utility in terms of translation into therapeutic action seems limited. 'Information-related' and 'corporate management', as they stand unqualified, are fairly meaningless black box terms to attempt to apply to reality. 'Interpersonal relations' and 'crises of confidence (or competence)' sound rather more meaningful and certainly more intriguing, but could also benefit from expansion and clearer definition.

What the broad-based analysis did provide, however, was a feeling for the sheer weight of difficulty in a general related area. It also revealed significant differences at this generalised level of problem definition between various kinds of people. Although problem incidence was at a similarly high level in all the subgroups of the sample, the nature of problems experienced did vary, even when the problem category was created by agglutination of related subsidiary specific problems. In fact, it was somewhat easier, given sample size, to see this trend when the analysis was reduced by clumping.

No significant differences were found between chemists, engineers and insurance staff in the distribution of the broad problem areas. Considerable and significant differences, however, were evident between managers and practitioners, and between users of library-information services at work,

TABLE 1. *Broadly defined aspects of the job presenting difficulty*

Base (100%)	*Whole sample* 448%	*Managers* 217%	*Practitioners* 231%	*Users* 150%	*Non-users* 70%	*No service* 228%
Corporate management	28	36	21	25	41	26
Interpersonal	39	48	31	37	34	42
Own competence	44	39	48	51	29	44
Information-related	45	36	53	49	50	41

voluntary non-users and people lacking a service to use (see Table 1).

In classifying respondents as managers, we used not only job title, but also the more detailed information provided on function/position within the company. Managers, for our purposes, were defined at a fairly modest level, as people habitually carrying substantial responsibility for the work of others. The term thus spans top and middle management. The nature of our sample, however, makes this manager group more homogeneous than might at first appear. In actuality, no pure career administrators were recruited via the sampling frames used (memberships of professional associations).

In distinguishing between managers and practitioners, the aim was to see whether exercising a management function—ie accepting responsibility for other staff—affected the issues under investigation in the study. In its widest context, for instance, it is a traditional belief of the information community that managers have rather special information needs, and usage or acquisition behaviour patterns. In the narrower setting of the topic of this paper, the question arising is whether managers and professional practitioners experience different problems at work—or, to phrase it more precisely, have different problem distribution patterns and ratios.

In fact, differences between managers and practitioners went in the direction one might expect, quantifying commonsense expectations, in ways and for reasons that it would be tedious and totally unnecessary to spell out in great detail. Sufficient to say perhaps, that as Table 1 indicates, managers had more problems in the area of management itself than practitioners did. Managers' worries thus embraced the operation, financing and resourcing of their organisation (or discrete parts of it) in a period of economic recession and uncertainty. Ensuring profit margins (or simply keeping the firm, group or department 'in the black'), corporate viability and planning for the future were felt to present particular difficulties under prevailing conditions. Dealing with colleagues and subordinates whose part in plans must be optimised obviously also presented problems of some magnitude. So staff management and relations predictably loomed higher for anyone with managerial duties.

Practitioners were more troubled than managers by doubts about their own competence within their specific job and their own more general professional expertise. On the basis of this finding (relating to crises of self-confidence, a sense of professional inadequacy, inability to cope with certain demands of the job), a need for continuing education, training and retraining seems demonstrated. Library-information departments could do a certain amount to help by stocking the right material to update and expand expertise. The basic problem, however, is more properly the concern and responsibility of top management, and personnel and training officers.

Practitioners were also more prone to information-related problems than managers. On this evidence they would seem to represent a more natural market for library-information services than managers. High-quality supportive information and documentation relating to management theory and practice and to applied psychology might, however, be of more than marginal benefit to managers. Information services could go some way towards meeting this management need, but more than even their best efforts may be required here. Perhaps this is a problem soluble only at the level of the tertiary education system and company-training provision. A programme of formal and continuing education, training and retraining may be required, rather than access to self-education via information and documents. Provision of the latter facility is far better than nothing, but hardly seems to be all that is necessary, even in the case of intelligent and well-motivated personnel (which one must assume management to be, albeit somewhat pressed for time to devote to an unfocussed, unofficial process of self-improvement).

In addition to an apparent need for appropriate continuing education manifested by both managers and practitioners, another general point of some importance emerged from the manager-practitioner analysis. It seems most undesirable that the level of interpersonal problems indicated by our findings should pertain at work, anywhere or at any time. Thirty-nine per cent of our whole sample (48 per cent of managers and 31 per cent of practitioners) were worried and impeded in doing their job by the obstructiveness and unco-operativeness of others, or by their own inability to relate to other people (or by a disastrous combination of both factors). If this is in any way typical or indicative of the wider reality of commerce and industry, it represents a miserable and counter-productive state of affairs. A serious failure of communication, of co-ordination and motivation of human resources, even of simple good-will and mutual tolerance in a common cause is indicated, requiring sympathetic attention at the highest management level. The word sympathetic is advisedly used. When specific problems are examined later in this paper, it will be seen that cross-disciplinary, almost cross-cultural resentments expressed are very natural and comprehensible. Often they are exacerbated by impinging external factors like shortages of time, staff and funds. Chronic (as opposed to acute with foreseeable end) stress situations do not facilitate good relations and communications.

Let us return to the analysis of broad problem areas. As Table 1 shows, this was also carried out in another 'dimension', or from another viewpoint, with interesting results. This cross-sort was based on usage, non-usage and deprivation of formal staffed library-information provision at the workplace. Usage-based differences did not, however, conform to or confirm hearsay and mythological belief. In the simple break between users and non-users of existing services, information-related problems stood at the same rather high level for user and non-user alike. Half the respondents in each category spontaneously complained of information-related problems at work. This finding hardly flatters current formal provision of library-information services at work and deserves deliberation as to cause.

The apparently surprising lower level of mention of information-related difficulty amongst those lacking a service may indicate a possible reason for the similarity of response from users and non-users. The 'deprived' seemed less aware of possessing information-related problems as such—but this does not necessarily mean that they did not experience them. Immunity may represent a state of mind. Problems when they occur may be attributed to other causes. Questions of problem perception, terminology, definition and sensitisation to information as a concept or commodity may be involved. Quite conceivably, the deprived might interpret an information problem as something else—a failure in communication, not knowing the right experts or sources, a lack in their own experience, expertise or education perhaps.

Non-users of formal services might just be similarly influenced. On the other hand, possession and use of information facilities might increase awareness of needs and lacks amongst users. It is possible that users may not have a higher level of information problems than the deprived and a level comparable to non-users; users may simply be more conscious that they have such problems, or they may attribute more of their problem load to an information-related cause.

Of course all these suppositions are highly debatable, but then so is a simplistic reading of the data, leading to the conclusion that libary-information services perform no useful function within firms. In this context of thought it is, however, worth considering that many of the deprived and indeed many non-users had alternative non-traditional information sources within the organisation (corporate memory systems, company documentation and internal literature providing guidelines and establishing precedents for problem solution, online access to relevant databases, etc). Only 17 per cent of the whole sample asserted that absolutely no provision at all was made by their employers for employee needs for information or documents. Alternative and home-grown facilities were often praised as excellent, because they were 'tailor-made' to the needs of the industry and the particular firm. Conventional library-information services were sometimes felt to have a fuzzier focus and suffer by comparison. Quantitative and qualitative evidence here *could* indicate that such unconventional or innovative systems are at least as effective and appreciated as traditional library-information services. At best they can represent a 'personalised' and fresh approach to a very old problem—being sufficiently well informed to make a sensible decision. Perhaps their features and advantages, as perceived by their supporters, would merit study by managers of library-information units?

Other differences between users and non-users are worth noting, as they tentatively profile personality and work style. Users, for instance, were less confident of their ability and competence than non-users and the deprived. When considering problems in detail it also became apparent that users were rather over-stressed or stretched people. For both these reasons, users may be prepared to seek any help they can get, from any and every quarter, including the library.

By contrast, non-users would seem to be self-confident and self-sufficient people. Other evidence from the survey showed that non-users had few problems in coping with and finding their way around 'the literature' of their field unaided, despite (particularly in the cases of chemistry and engineering) its great size and complexity. Non-users, however, suffered from more management-area problems than both users and the deprived. Incidentally, this was not because the non-user group included more managers. Work status, in fact, bore little relation to use and non-use (and obviously provision) of onsite library-information services. One might conclude that both formal library-information services and the informal or alternative systems developed within non-using organisations do cater for management information requirements and do help with management problems to an appreciable extent. So an employee may pay a price for failure to make use of whichever of these services is available. Are non-users over-confident 'loners', not quite the masters of their fate, discipline and job that they feel themselves to be? Could users be realists, who know their own limitations, rather than incompetent or lacking in professional assurance?

Earlier in this paper it was indicated that consideration of problem typology in greater detail would not only make the broad-band 'blanket' headings or major problem areas more meaningful, but would thereby increase the potential applicability of research results to reality. Unfortunately, within the confines of a short presentation it is impossible (and probably undesirable) to provide this data in its full complexity, particularly in relation to differences between subgroups of the sample. Of necessity then, the following account must be somewhat selective and impressionistic.

Questions to be asked in relation to the detailed material include:

(a) What kinds of problem came under each of the broad heads?
(b) Can anything be done about them: what action is suggested by findings?
(c) How complex and diverse is the problem patterning within each major sector?

It was, for instance, noticeable that the broad areas varied in the number of their subdivisions and in the extent to which respondents might suffer from a multiplicity of observably different minor problems in the same general area.

Taking the broad areas in the order of their presentation in Table 1, let us examine first the corporate management difficulties experienced by 28 per cent of the whole sample, either in running or operating within the firm. Four versions of the basic problem were described by respondents. Operating during a recession and consequent financial worries were cited by 13 per cent of the whole sample.

Marketing strategies and tactics proved onerous for 11 per cent. Forward planning, forecasting and estimating represented uphill work in perceived uncertain times for 8 per cent. Organisational control, company management and administration *per se* were mentioned as a cause for difficulty by only 5 per cent. This last category is in the traditional core management area. Yet it seemed to occasion the least aggravation. The three other areas giving rise to concern can be viewed as having an underlying connection. They demonstrate the impingement of an external factor—the prevailing economic climate—on management, rather than problems intrinsic or inherent in the exercise of the management function or the experience of its consequences, regardless of the state of the nation or the economy. Typical comments included the following complaints:

'Usual shortages of staff and time. Trying to keep abreast of modern analytical development. Fighting bureaucracy inside and outside the Company.'

'Making the firm grow faster—hence knowledge of areas in which to diversify. Keeping the firm financially sound—hence knowledge of the short-term future of the economy.'

'Maintenance of total service despite impending cutbacks in personnel. Reduction of manufacturing costs whilst maintaining adequate quality standards.'

'Trying to make a profit in spite of the fact that there are always some territories and some sections of business going wrong: not to mention Prime Ministers exhorting business to "plan ahead"—while they (Ministers) change their minds without warning about every three months.'

'Uncertain nature of government finance. Civil engineering industry used as regulator for economy. Continual stop-go makes running a business very difficult.'

A need for high-quality, up-to-the-minute, even predictive management information as a basis for decision-making is implicit in the above findings and illustrative comments. Such provision would need to cover not only economic and market trends, but to guide inevitable investment in information technology and new technology, to smooth the path of office and industrial-commercial automation. The special supplement 'Technology Extra' of the *Observer Magazine* (11 September 1983) recently related some real-life horror stories of the consequences of 'computer illiteracy'. Documented accounts were given of smaller firms reduced to bankruptcy by the uninformed acquisition of (in some cases successive) unsuitable computer systems, possessing restricted potential for expansion, or sometimes even inadequate capacity for the task in hand at the time of installation. Comments reinforcing a need for IT and NT information and education and confirming the prevalence of computer illiteracy came from some of the respondents currently concerned about their personal competence.

Interpersonal stresses and strains at work divided quite simply in terms of internal and external relations. Finer analysis was theoretically possible, but at this level the data became rather too industry-occupation specific and/or ambiguous. More information about working relationships than we possessed would have been necessary for accurate classification. In any case, the important distinction seemed to be between inside and outside contacts. Intra-company relations appeared to be the major source of trouble, reported by 29 per cent of the whole sample. The public interface was mentioned by fewer respondents (13 per cent) as a hard area in which to operate. Perhaps colleagues featured more prominently as irritants because they were necessarily on the spot and inescapable, therefore more continuously abrasive? Interestingly enough, respondents tended to suffer from only an internally, or only an externally directed problem. Only 3 per cent of the whole sample suffered from both versions of the (other) people problem. This distribution seems likely to reflect the nature and ambient conditions of work undertaken. Nevertheless the general level of difficulty is indicative of a need for training and sensitising in interpersonal relations and communication skills. Different does not necessarily mean deficient or inferior. Yet a marked lack of respect for difference was evident in some answers. This can only be counter-productive, as in any work situation people of different skills and abilities must somehow integrate and co-operate in a common cause and work towards corporate aims and objectives. Similarly, alienation from customers and inability to understand and communicate with them seems hardly likely to boost sales or burnish the brand image. Study of the work environment, in the broadest non-mechanistic sense, might also reveal compounding factors. Over-stressed people do characteristically find fault and fall out with one another. Evidence of stress did emerge in this survey.

Internally directed difficulties included staff-management problems, selection, motivation, training, and retention of staff, and above all simply getting on with superiors, peers, subordinates. Problems cited included: 'internal company politics/personality clashes'; 'poorly informed higher management'; 'persuading people to act sensibly'; 'control of labour, instilling a sense of purpose into personnel'; 'supervising people more experienced than myself in their own job speciality'; 'neutralising effects of external administrative stupidity on morale of the project team'.

Some answers were more specifically targeted at particular individuals of groups: 'working under a Managing Director who inherited the Company'; 'communicating urgency to non-technical people about the needs of my group'; 'operator error: failure to follow process instructions exactly. Inadequate data: failure of product developer to provide requested data on time'; 'getting staff to work properly. Keeping founder and senior partner happy'; 'my boss tells me what to do and I do it and sometimes we suffer by it.'

One engineer summed up other less verbally fluent or cogent laments most succinctly, saying: 'working with other engineers who are not very efficient. Coping with the monotony of daily routines! Getting other people to do things they don't want to do. Contractual arguments, poor pay and conditions. Two degrees, eight years' experience, MICE, I earn less than nearly all the men on any construction site.'

Public relations at the interpersonal level covered not only dealings with clients and customers, but with intermediaries, suppliers, contractors and 'others in the same line of business' (ie competitors). Such interaction could give rise to friction, albeit to fewer respondents, as the following quotations from questionnaires may indicate:

'Trying to explain various laws and regulations to absolute laymen—especially absolute laymen who *think* they know all about insurance.'

'Convincing Japanese owners that they do NOT know all the answers. Completing returns in impossible time for the DoT. Struggling with outside accountants.'

'Persuading an agency to use press instead of or in addition to television, for client advertising.'

'Negotiation with statutory authorities' and 'getting through building inspector and district surveyor red tape.'

'Identifying clients' exact requirements and resisting changes of mind.'

'Dealing with members of the public who are unaware of the need to underwrite life insurance and who turn up with a proposal form expecting to be given a policy document. When it is explained that we may need a medical, for example, they become upset. Especially nasty when insurance is needed in conjunction with a mortgage and they require almost immediate acceptance.'

Six recognisably separate problems revealed themselves within the overall framework of personal competence and professional expertise, which troubled 44 per cent of respondents. Self-management was the most frequently mentioned (by 19 per cent of the whole sample). Managing one's own time and resources, priority allocation, coping with deadlines, stress and conflicting chronic demands were cited. Crisis management and meeting sudden urgent workload-surges were experienced.

Gaps in respondents' own technical or professional expertise were keenly felt by 13 per cent. These respondents were conscious of lack of experience, knowledge and training. Some professional areas of operation were seen as intrinsically and particularly taxing in this respect. Decision-making and risk-taking were dreaded by 12 per cent, who feared failure and its consequences, both personal and corporate.

Poor support facilities (widely defined to include those depended on outside the firm) affected 10 per cent. As a result, they were forced to resolve bothersome, low-level, practical, peripheral, non-professional problems. Not all of these were intra-company. Delays, for instance, can also be caused by suppliers or the postal service. Other irritants included clerical, operator and typing errors, computer bugs, travel and its arrangement, plus generally defective or absent support services at the workplace.

Maintaining one's own creativity, keeping up an output flow of new and original ideas worried 3 per cent. All of them were chemists. Innumeracy, inability to handle numerical data and statistical work was admitted by 3 per cent.

Some of these problems seem susceptible to library-information assistance, both active and passive, in fairly obvious ways. Availability of varied and current literature, in itself, is a widely recognised stimulus to idea generation—eg the beneficial browsing syndrome. Focused information search and personalised current awareness service can aid decision-making and save time otherwise spent in DIY information activity and self-updating, by people who really have no time to spare.

Information-related problems recognised as such by respondents represented (marginally over questions of competence and confidence) the largest area of concern (45 per cent mention). It should be stressed that respondents defined the information problem area more widely than library-information practitioners might do. Nine identifiably different versions of an information problem were isolated in analysis. Multiple experience of several specific problems in the general area was common.

Timing of information supply was crucial, 13 per cent of the whole sample believed. These people had trouble getting the right information at the right time—to proceed, or proceed safely, with present work. The value of information can thus be time-dependent and not solely in terms of its currency. Information received 'too late to be of use' is a bitter and ironic gift.

Interpretation and validity assessment of information acquired was not an easy task for 12 per cent. Peripheral information from other fields was also hard to come by and sometimes hard to understand for 11 per cent. Typical instances included market, trade, new technology, medical and confidential information. Insurance operatives were particularly prone to such worries, for example when 'determining a risk' in an unfamiliar occupation or geographical/political location, although engineers were by no means immune to similar phenomena.

Presenting information, communicating, reporting and explaining was not an easy process for a further 11 per cent. This admission links with and reinforces the findings on people-related problems previously reported.

Keeping pace with change and generally up to date was almost impossible for 10 per cent of the whole sample. A further 3 per cent mentioned the closely allied difficulty of lacking time or making time to read.

Internal company information flow problems were cited by 9 per cent, who complained of the absence or delinquency of central organised records systems, of bad internal communciations, of failure to record and communicate important decisions and precedents, and of generally poor paperwork control.

Translating academic theory into workable practice was something that disturbed and defeated 5 per cent of respondents. This is somewhat akin to the interpretation difficulty, but is subtly different. It is a criticism levelled at the published literature, at authors of 'standard texts' and at academic researchers. Readers can understand the theory perfectly well. Theoretically relevant data is not, however, analysed, presented or even collected in ways suitable or useable for the readers' purposes. 'Pure' research experimentation may connect only marginally with the preoccupations of, say, a chemist engaged in development work.

Finally, one complaint referred quite specifically to a particular kind of information as being hard to obtain. Legal, legislative and government information presented special acquisition difficulty to 4 per cent.

In this paper and the study on which it was based, some problems and constraints under which some professional staff in commerce and industry were operating during the early 1980s seem to have been identified. With less assurance, some ideas have also been put forward concerning alleviation and cure. In making such suggestions a researcher must adopt a tentative and cautious approach. Detection is the researcher's legitimate business. Missionary advice and activity is, strictly speaking, outside the researcher's scope of competence. Researchers who stray too far outside their remit risk finding, like Chandler's Marlowe, that *trouble* has become their business, perhaps deservedly. Nevertheless, airing the topic of 'problems at work' fairly discursively may do some good, if it is noted by those capable and empowered to act in the areas of information management and simply management.

ACKNOWLEDGEMENTS

Base material for this paper was collected by survey and formed part of a study of reasons for non-use of library-information services at the workplace, funded by the British Library Research and Development Department and carried out at Aslib by the author.

REFERENCE

1. SLATER, M. *Non-use of library-information resources at the workplace: a comparative survey of users and non-users of onsite industrial-commercial services.* London: Aslib, 1983 (Research Report Series No. 7).

3 IMPORTANT NEW PUBLICATIONS FROM ASLIB

Creating an Information Service, by Sylvia Webb

Sylvia Webb describes in a positive and practical way how to set about the task of establishing a library or information service with little assistance from support staff. This volume has particular relevance for those working as one man bands, i.e. those running a service single–handed, and those who may have little experience in the operation of special libraries. The emphasis is on simplicity and efficiency in all the procedures and techniques discussed, and checklists are provided to help the reader to establish an appropriate and properly integrated service.

(ISBN 0 85142 186 5) UK £9.50 (£8.00);** overseas £11.00 (£9.50)

The Translator's Handbook, edited by Catriona Picken

Just published, the Translator's Handbook provides an essential guide to the growth industry of translation. A completely revised and enlarged edition of Technical Translation Manual, published in 1971, this new volume pays close attention to every detail of the translators' profession – including working procedure, training, relations between translator and client, and the description and enumeration of hardware and reference material.

(ISBN 0 85142 173 3) Hardback UK £18.00 (£16.00); overseas £21.00 (£18.00)
Paperback UK £13.50 (£11.50); overseas £15.50 (£13.50)

Library Automation: a current review, by Peter Gillman and Silvina Peniston

This report examines areas of library automation in terms of the hardware and software available. It deals with systems intended for library automation, with examples of the use of these systems. It also covers some wider aspects of information technology which may be used in libraries.

(ISBN 0 85142 188 1) UK £11.00 (£9.00); overseas £13.00 (£11.00)

**(Aslib Members' prices shown in brackets)

Professional publications are only one of the ways Aslib can help. Ask us for our new membership brochure and find out more.

The Association for Information Management

Aslib 3 Belgrave Square
London SW1X 8PL
telephone 01-235 5050 telex 23667

4 MAY 1984

Aslib Proceedings

VOL. 36 NUMBER 5 MAY 1984

EXPERT SYSTEMS: THE CHALLENGE FOR INFORMATION IN THE '90s?

Aslib and Aslib Informatics Group Joint Conference, London, 5 December 1983

The effects of Expert and Allied Systems on information handling: some scenarios 213
Kevin P. Jones

Machine learning systems 219
Richard Forsyth

A 'front end' system: an Expert System as an online search intermediary 229
A. S. Pollitt

Developments in Information Technology: an overview 235
Peter L. Gillman

ASLIB PROCEEDINGS

Volume 36 MAY **Number 5**

Aslib Proceedings carries papers given at Aslib meetings and conferences, and contributed papers of interest to practising professionals. These describe innovations in information management techniques, applications of existing information products and services, and case studies of information units and special libraries. The contents of the journal are reviewed by an editorial board.

Aslib Proceedings is published monthly and supplied free to members of Aslib. Annual subscriptions to non-members: £50 (UK)/£60 (overseas); additional subscription to members: £30/£35. Single copy prices and subscription information are available from the Subscriptions Department, Aslib, 3 Belgrave Square, London SW1X 8PL.

Manuscripts and editorial enquiries should be addressed to the Editor, *Aslib Proceedings,* Aslib, 3 Belgrave Square, London SW1X 8PL. Manuscripts should be 1,000 to 3,000 words, typewritten, double-spaced, single-sided on A4 paper. Figures should be reproducible. An abstract of up to 200 words should be included. References should follow British Standard 5605:1978. Published authors will receive twenty-five free offprints of their article.

Advertising information is available from the Editor, as above. Further information about Aslib's services and membership rates will be supplied on application to the Director, Aslib, The Association for Information Management, 3 Belgrave Square, London SW1X 8PL. Telephone: 01 235 5050; telex: 23667 (answer-back Aslib G).

© 1984 Aslib and contributors

ISSN 0001 253X

The effects of Expert and Allied Systems on information handling: some scenarios

Kevin P. Jones

Malaysian Rubber Producers' Research Association

Paper presented at the Aslib and Aslib Informatics Group conference 'Expert Systems: the challenge for information in the '90s?', Royal Aeronautical Society, London, 5 December 1983.

THE PIONEERS of computing, notably Weaver, Booth, Turing and Luhn, were extremely optimistic about the progress they expected to occur in what would now be termed Artificial Intelligence. The implementation of mechanical translation was expected to be rapid, for instance. Judged in terms of this early promise, progress has appeared to be slow and erratic. Exciting individual projects, like Winograd's SHRDLU, have shone out like lighthouses through the gloom only to gradually fade back into the mists. Most progress has been made in restricted fields and there are few signs that significant progress has been, or is being made in tackling the major problem, namely that of designing information systems capable of accommodating the fundamental problem of words having many meanings, and its correlate of identical or similar things being portrayed by a multiplicity of words.

What basis is there for this caution? None, except in so far as it is always tempting to grasp each new technique as a universal panacea, and experience shows that this is not the case. The effect which any new technology, such as Expert Systems, may have on existing technologies is complex. The new technology may influence the existing technologies rather than supplant them, or the existing technologies may be modified by other novel, possibly related, technologies, and therefore be less liable to be affected by the new technology. Furthermore, changes, social changes for instance, may affect the overall framework within which both the existing and the novel technologies operate. It is also possible that the new technology may induce spin-off capable of introducing major changes in related, or even unrelated, fields.

Before any of these possibilities can be explored it is necessary to ascertain the proximity of Expert Systems to librarianship and/or information science. Increasing use is being made of computerised systems by everyone, and librarians and information scientists cannot be exceptions on this very general level. For years, most people will have been paid via a computer and most will bank via a computer, and so on. On a different plane, there is an

Aslib Proceedings, **36** (5), May 1984, p. 213–217. Printed in Great Britain.

increasing tendency to bring computerised systems into the specialised domain of librarianship and information science: mechanised cataloguing and online information retrieval are two typical functions. Just as improvements in hardware, software and general computer competence will affect computing in general, so will these developments filter down to information retrieval and mechanised cataloguing. Thus, even if the information professions are content to do nothing at all, improvements in computerised systems will come to them, whether they wish it or not.

Expert systems are essentially diagnostic: therefore it is highly pertinent to examine the extent to which diagnostic systems are relevant to librarianship and information science. To a great extent Brooks[1] and Pollitt[2] have answered this by demonstrating areas which are transparently relevant to the application of Expert Systems. Helen Brooks states that effective searching is a 'non-trivial problem, even for highly trained, subject specialist intermediaries, let alone end-users'. Each host system tends to employ its own command language, each database also tends to adopt distinctive structures, and a number of commands are needed to access the host system through the packet-switching network[3]. A few databases can be interrogated via free-text searches, but to make the fullest use of many, it is necessary to be familiar with systems of classification and controlled texts. Some databases are highly structured: notable examples are the MARC system and *Chemical Abstracts*. Even seemingly simple operations, such as the quest for author names, are hindered by a total lack of standard features shared by the community of database producers. Add to this the complexity of determining what the user really requires, and the fact that the searcher may seldom be aware of his own real needs, and how these may be answered: then it is certain that the problem is not trivial. Furthermore, the operation of online searching takes place within the environment of the computer.

Clearly there is a diagnostic function in attempting to define what users require and how these requirements may be fulfilled. But what other areas may be appropriate for the application of these new techniques? An attempt will be made to answer this by firstly considering applications which are central to information work, and then broadening the search into other areas (publishing, for instance) which may be changed by the emergence of Expert Systems.

The selection of the correct classification entries within single-place classification schemes is an avenue suitable for exploration, even though some may be tempted to consider that single-place classifications are inappropriate tools in an age of advanced information-handling techniques. Unless one is willing to accept the postulate that *all* communication will be in the form of machine-readable records, then there would still appear to be a need for bibliographical classifications. Correct placement calls upon a considerable amount of expertise and ideally involves a consensus approach which is also demanded in the construction and expansion of such systems. Bibliographical classifications, notably the Universal Decimal Classification (UDC), are founded upon a consensus of (one hopes) expert opinion: one of the major hindrances to this activity is the difficulty of corralling the experts into a single place. Another difficulty is that bibliographical classifications tend to date rapidly and documents relating to novel ideas cannot be accommodated. The application of Expert Systems to the construction, revision and operation of single-place classification schemes is therefore highly appropriate. The fact that Expert Systems are seldom expected to produce completely watertight solutions would appear to be rather more realistic than the claims made by some of the human designers of such classifications.

It is a small step from bibliographical classifications to specialised thesauri. If these could be made more dynamic, then they might form a more appropriate adjunct to mechanised retrieval systems. The thesaurus might be built up and modified by the experience of searchers as well as by indexers and specialised thesaurus constructors. In effect the system would encapsulate individual expertise gained from employing the system. Brooks and Pollitt are envisaging systems which will be satellites to existing systems, but which will not modify the systems themselves. It should be possible, however, to extend the interface zone by employing feedback to create adaptive, dynamic systems. For obvious reasons such expert information retrieval systems could currently only be envisaged as operating within highly specialised environments.

On a very immediate plane, it would appear to be highly advantageous to employ the *presentational* techniques being developed for Expert Systems to front-end information retrieval systems and other databases. As the information does not exist it will not be possible to provide justification for straightforward Boolean searches, but if additional search aids, of the thesaurus-type, were to be incorporated and used 'intuitively' by the machine, then justifications would be appropriate. Synonyms and homographs could be resolved automatically for instance, but it would be appropriate for the system to report on these transitions, and 'learn' from this whether its changes were appropriate or otherwise.

Manuals probably form the most significant group of bibliographical materials liable to be affected within the short term by the emergence of Expert Systems, as manuals are closely associated with the diagnostic process. In an attempt to keep them up to date many producers of manuals maintain them in loose-leaf binders, or on COM, but even in these forms manuals tend to be out of date. Thus one may expect Expert Systems to be competitive with traditional bibliographical products in the sphere of manuals.

To an extent Expert Systems may offer an alternative means of publication. At present many workers in diagnostic fields, especially medicine, use traditional publications (books, journals and conference papers) to inform their associates about improvements in diagnostic techniques. It is possible that the implementation of Expert Systems may alter this pattern either by supplanting it or by modifying it. If the former is followed, then the present free-trade aspect of publication might be replaced by a number of closed systems which, unless computer networking is to grow on a vast scale, will remain closed to what at present forms a much vaster, but very random, potential readership.

If electronic publishing comes to play a significant role in the communication of research results, then it is possible that improvements in diagnostic techniques implemented via Expert Systems may be reported in this manner. Even this advance in publishing technology may be cancelled out by other pressures: Expert Systems are by their nature intended to form a totality of knowledge within limited domains, and the human experts who interact and rely upon this novel corpus of knowledge may be tempted to restrict access to it to maintain their own standing as a body of specialists.

On the other hand, some organisations contain a very great deal of expertise which they may be ready to promulgate, but are precluded from doing so because their staff are reluctant to communicate via traditional means. In general, theoreticians are more willing to write than practitioners—the reason is obvious: the theorist can only express his ideas through speech and writing, whereas the practitioner can express himself through his artefacts and methods. It is possible that Expert Systems may be engineered to fill this lack in human communications, especially if the potential communicators are technicians.

In this type of system, great skill would appear to be needed in constructing the knowledge base. If the construction of this base has to involve techniques similar to traditional communication, especially if much writing is involved, then it will fail for the same traditional reasons. It is premature to propose a system of spoken discourse between man and machine, although this is probably what is needed. Nevertheless, it may not be absurd to propose an Expert System which, either as its central function or as a component of it, provides a report-writing module. Much technical literature is prepared in fixed formats. It has been common practice for many years for data-handling programs to convert the data captured into tables and graphs—the report-writing module would be but an expansion of this technique into the sphere of simple, stylised literary effort. Following from this it should be possible to devise writer assistance packages which correct inferior grammar, poor spelling (this is an area where significant progress has been made), and modify texts to meet particular house styles.

To return to publishing, it is worth remembering that some traditional printed publications are not only difficult to compile, but are also complicated to use. There is a trend to make some of these complex works available online. It may be possible either to replace these by Expert Systems as such, or front-end them by an expert interface as is envisaged for online systems in general. Works which may be suitable for replacement by Expert Systems include timetables—by their nature they tend to be out of date and are by tradition difficult to use. Works which might be front-ended could include encyclopedias and handbooks, such as *Beilstein's Handbuch der organischen Chemie*.

It may also be possible to employ the techniques developed within Expert Systems to analyse human expertise where it is not immediately obvious how the human practitioner functions: in part the medical systems, like MYCIN, are exploiting this ability at present. There is also a possibility for capturing human expertise *without* the co-operation of the human experts. For instance, indexers appear to be unable to develop algorithms to explain how they tackle their work, and have even boasted that because their activity is currently non-algorithmic then it is bathed in some mystic aura. Nevertheless, with the spread of computer-driven book and periodical production, it should be possible to borrow the appropriate facets of Expert Systems programming to develop systems which compare the indexes currently produced by human beings with the machine-readable texts upon which they are based, and consequently establish the algorithms which the indexers must employ. Other allegedly non-algorithmic techniques embedded in the humanities may be vulnerable to this approach.

Some of these subjective, non-scientific techniques have been touched upon earlier. Most people find both reading and writing specialised text to be difficult tasks. Literature is grossly expanded by commentaries and reviews of others' work which attempt to make it more readable. There are many intermediaries in the current information business who are attempting to digest others' work and regurgitate it to a different audience. Would it not be possible to involve the mechanised Expert in this activity? There is some evidence that patients prefer to respond to a machine rather than to a human medical practitioner, because it is 'more private'. Most individuals hate criticism of their literary efforts, yet most prose is sorely in need of such comment: it is probable that an impersonal grammarian would be preferred.

A number of areas of information handling have been identified which may be appropriate for the application of Expert Systems. As emphasised earlier, successful new technologies do not 'go away' and the present information handlers cannot expect to pursue their current courses without some changes. In conclusion, it seems probable that the area of librarianship and information science to be affected most immediately will be online searching. The reason for this is obvious: there is a transparent need to ease access to online systems, this need has been recognised, and attempts are being made to develop Expert Systems, or systems which approximate to their norms, to facilitate this. Thus, online systems should be usable by a far larger number of people: the evolution of the professional online searcher must be regarded as a temporary aberration. The next most promising avenues appear to be the development of Expert Systems to handle the development and application of thesauri and classification schemes. Other areas of influence are more likely to arise through their application to other less immediate, but nevertheless potentially influential, areas such as publishing and communication in general.

REFERENCES

1. BROOKS, H. Information retrieval and expert systems—approaches and methods of development. *Intelligent retrieval,* ed K. P. Jones. London: Aslib, 1984.
2. POLLITT, A. S. A search statement generator for cancer therapy information retrieval. *6th International Online Information Meeting, London 7–9 December 1982.* Oxford: Learned Information, 1982.
3. JONES, K. P. Searching techniques: time to replace intelligent operators by systems. *6th International Online Information Meeting, London 7–9 December 1982.* Oxford: Learned Information, 1982.

Aslib Annual Lecture

Professor Donald Michie,
of The Machine Intelligence Research Unit,
University of Edinburgh,
will give

The 17th Aslib Annual Lecture

Automating the Synthesis of Expert Knowledge

at 18.00, Thursday 7 June 1984
at The Royal Aeronautical Society
4 Hamilton Place, London W1

All welcome

The Association for Information Management

Aslib 3 Belgrave Square
London SW1X 8PL
telephone 01-235 5050 telex 23667

Machine Learning Systems

Richard Forsyth

Polytechnic of North London

Paper based on speech given at the Aslib and Aslib Informatics Group Conference 'Expert Systems: the challenge for information in the '90s?', Royal Aeronautical Society, London, 5 December 1983.

WITH THE DRAMATIC RISE of Expert Systems has come a renewed interest in the 'fuel' that drives them—knowledge. For it is specialist knowledge which gives Expert Systems their power. But extracting knowledge from human experts in symbolic form has proved arduous and labour-intensive. So the idea of machine learning is enjoying a renaissance.

What is machine learning?

By machine learning I refer to any automatic improvement in the performance of a computer system over time, as a result of experience. Thus a learning algorithm seeks to do one or more of the following:

- cover a wider range of problems
- deliver more accurate solutions
- obtain answers more cheaply
- simplify codified knowledge.

The last point assumes that simplification of stored knowledge is of value for its own sake—ie that clearer expression makes knowledge more accessible to people even if it does not improve the computer's performance.

Machine learning could apply to almost any domain, but in practice most successful systems confine themselves to classification tasks, on which we concentrate here. Even this subset of problems includes a wide variety of important applications, as the following examples will show.

- Given the weather readings for the last seven days, predict whether a storm will arise in the North Sea during the next 48 hours;
- Given a poker hand and a record of the bidding so far, decide whether to call, fold or raise;
- Given a fossilised fragment of Australopithecine jaw, work out whether its owner was male or female;
- Given the results from a seismic survey, advise an oil company whether to drill or move on.

Aslib Proceedings, **36** (5), May 1984, p. 219–227. Printed in Great Britain.

A paradigm for learning

Any system designed to modify and improve its own performance must include the following major components:

(1) a set of information structures which encode the system's present level of expertise (the 'rules');
(2) a task algorithm (the 'performer') which uses the rules to guide its activity;
(3) a feedback module (the 'critic') which compares actual results with those desired;
(4) a learning mechanism (the 'learner') which uses feedback from the critic to amend the rules.

This is sketched diagrammatically in FIGURE 1.

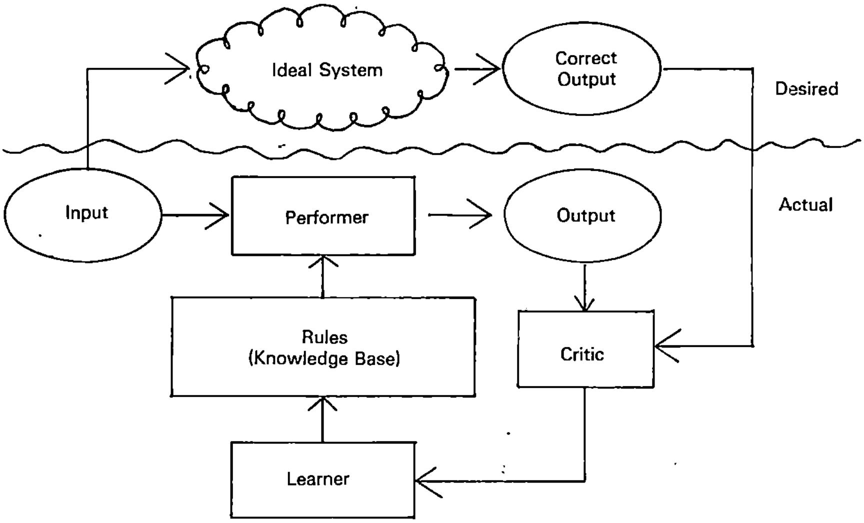


FIG. 1.

Most Expert Systems have a read-only knowledge base. What we are talking about here is an erasable-programmable knowledge base.

To focus our ideas on a concrete and familiar example, we will draw on a simple concept formation task for illustration through the rest of this article. We will assume the computer is presented with example hands containing four playing cards, e.g.

QH, TD, JC, 2S : T

together with a categorisation (T for True in this case) supplied by the teacher. Its task is to discover the rule(s) for distinguishing True from False instances. [This example represents a Queen of Hearts, Ten of Diamonds, Jack of Clubs, and Two of Spades.]

The description language

The key to success or failure in such a task is the description language.

The discrimination rules have to be expressed in some form of notation or data structure, and this must be adequate to describe the information in the input that determines the correct response. This is an obvious point, but it is all too easy to struggle in vain to force a computer to learn a concept it has no means of representing. The computer is thoroughly pragmatic: as far as it is concerned, a difference that makes no difference is no difference at all.

Let us return to our playing cards. Suppose the computer is given the following sequence of cases.

AH, JD, JC, 2S : T
2D, JH, AH, QS : F
8C, TS, 6H, AC : F
3H, 9D, 8D, 7D : F
5H, 3C, TH, 9H : T
AD, 3D, AH, 7H : F
JD, TD, 7S, 2D : F

Now what is the rule governing T or F? (Go on: try it yourself—before looking at the answer!)

If the rules are framed rather like search-strings in some text-editors, such as:

?D, 3?, 3?, ??

where a question mark (?) is a 'wild' card standing for any rank or suit, then the above rule would represent the concept 'any diamond, a three of something, another three and any other card'. In a real text-editor the sequence would be significant so we would presumably have to add: 'in that order'.

However we could relax the ordering constraint so that the pattern shown would match

3C, 3H, JD, AS

as well as

JD, 3C, 3H, AS

which extends the language somewhat.

But it does not extend it far enough to cope with the rule I had in mind, namely

```
if there are no red cards then F
else if there are no black cards then F
else if the lowest red card is higher in rank than the lowest black one
  then T
else F;
```

which you saw at a glance, no doubt.

If you think that rather unfair on a mere machine, try extending the rule for, say, two hearts, which is easy enough

?H, ?H, ??, ??

to capture the concept of a pair—any two cards with equal rank. In this language even such a simple concept as 'two of a kind' cannot be expressed by a single pattern. It would require several, as in

2?, 2?, ??, ??
3?, 3?, ??, ??
4?, 4?, ??, ??
etc ...

which is clumsy.

So before even starting to build a learning system, it is vital to ensure that the proposed rule description language is capable of expressing the kind of concepts which will be needed—and that is harder than it sounds.

Feature vectors

One neat trick is to use the same representation for the input as for the rules.

It is handy if you can get away with it, since it saves translation from data format to rule format. A particularly simple format received considerable attention in the early days of statistical pattern recognition.

If your data is a one-dimensional array of numbers, each of which measures an aspect of the input, a[i], i=1..N, e.g.

1, 7, 2, 0, −8, −19, 77, 4 ...

then this vector can be multiplied by an array of weights, w[i], i=1..N, e.g.

0, −1, −2, 0, 0, 1, 1, 0 ...

and the resultant sum of products compared to a threshold (typically zero). If the sum exceeds the threshold, the machine classes the input as a positive example, otherwise it classes the input as a negative example. This is the basis of the Perceptron, whose learning algorithm works by re-adjusting the weightings after an erroneous response, as follows:

> If the sum of products was greater than threshold and the answer should have been *No*, then subtract the a[] values from the corresponding w[] values;
> If the sum was less than threshold and the answer should have been *Yes*, then add the a[]'s to the w[]'s;
> If the answer was right, leave well alone.

In effect, the weighting vector w[] expresses the system's knowledge: it indicates the importance of each input feature in the discrimination task. The algorithm is simple, elegant and efficient, as long as the two classes are 'linearly separable' and the training set is not very noisy. It can also be extended to handle more than two categories.

Unfortunately many real-life classification problems are not linearly separable. In practice it is almost impossible to find a set of features which are truly independent. The feature-vector approach breaks down even on apparently trivial problems like 'there is a heart to the left of a black card'.

More powerful languages

Structural learning—where the relationships between elements are important as well as the attributes of those elements—precludes the use of feature-vectors in their basic form.

Most structural learning systems employ some form of Predicate Calculus representation, often extended in certain respects [e.g. Michalski[1]]. A language for our card-hand domain would need functions like

left-of(a,b) right-of(a,b)
rank(a) suit(b)

as well as logical and comparison operators

AND, OR, NOT
⟨, =, ⟩, ⟨⟩, ⟨=, ⟩=

but even they might not suffice. For instance we could say

rank(C1) = rank(C2) OR
rank(C1) = rank(C3) OR
rank(C1) = rank(C4) OR
rank(C2) = rank(C3) OR
rank(C2) = rank(C4) OR
rank(C3) = rank(C4)

to express the notion of a pair; but how could we encode 'there is a diamond of lower value than any heart or spade'?

The choice of a compact, expressive notation is far from easy. And remember: playing cards are a 'toy' problem area.

Learning by searching

Assuming that we can solve the non-trivial problem of devising a good description language, how do we automate the generation of accurate descriptions in it?

One way of looking at the problem is as a search through the space of all possible descriptions for those few which are both true and useful in the current context. The number of possible descriptions is astronomical, and the more expressive the language, the more explosive is this combinatorial problem.

Clearly some way has to be found of guiding the search and thereby ignoring the vast majority of potential descriptions (concepts) which are irrelevant to the purpose in hand.

A number of methods have proved successful with noise-free training instances (e.g. Langley[2], Mitchell[3]). We shall restrict ourselves here to considering two specific example systems that can deal with noisy data.

ID3

Quinlan's Interactive Dichotomizer 3[4] is not very robust in the face of noisy data; though it could in principle be improved in this respect if it did not always seek a 'perfect' rule. The program works as follows.

(1) Select at random a subset of size W from the training instances (the 'window').
(2) Apply the CLS algorithm to form a rule for the current window.
(3) Scan the entire database, not just the window, to find exceptions to the latest rule.
(4) If there are exceptions, insert some of them into the window and repeat from step 2; otherwise halt and display the rule.

The CLS algorithm[5] repeatedly partitions the training instances according to the variable with the greatest discriminatory power. Quinlan used an information-theoretic measure of entropy for this purpose. Each subset as defined by the most discriminatory variable is partitioned again (unless it contains only one class of data) on the next most discriminatory, and so on. This process produces a decision tree.

ID3 trees performed well on a series of King–Rook/King–Knight chess endgame problems. ID3 can cope with a little noise, but not much; so chess is a suitable domain for it. Really noisy data leads it to grow very bushy decision trees which fit the training set but do not generalise well to new examples. Another limitation of ID3 is that it uses feature vectors to describe the data (though not the rules).

ID3 is commercially available as 'Expert-Ease' in the UK.

BEAGLE

BEAGLE (Biological Evolutionary Algorithm Generating Logical Expressions) is a computer package for producing decision rules by induction from a database[6]. As such it attacks the problem, frequently side-stepped, of where the rules in a rule-based system come from.

BEAGLE works on the principle of 'Naturalistic Selection' whereby rules that fit the data badly are killed off and replaced by mutations of better rules or by new rules created by mating two better adapted rules. The rules are Boolean expressions represented by tree structures.

The software consists of two Pascal programs, namely HERB (Heuristic Evolutionary Rule Breeder) and LEAF (Logical Evaluator And Forecaster). Together they perform the task of classifying samples into one of two or more categories on the basis of the values of a number of variables or features. HERB creates or modifies rules which LEAF then uses.

Points:
1. Payoff file defines costs of various kinds of mistakes.
2. Initial Old Rule File may be empty.
3. Rules are Boolean Expressions.
4. LEAF is just one way of using the rules.

BEAGLE Synopsis:

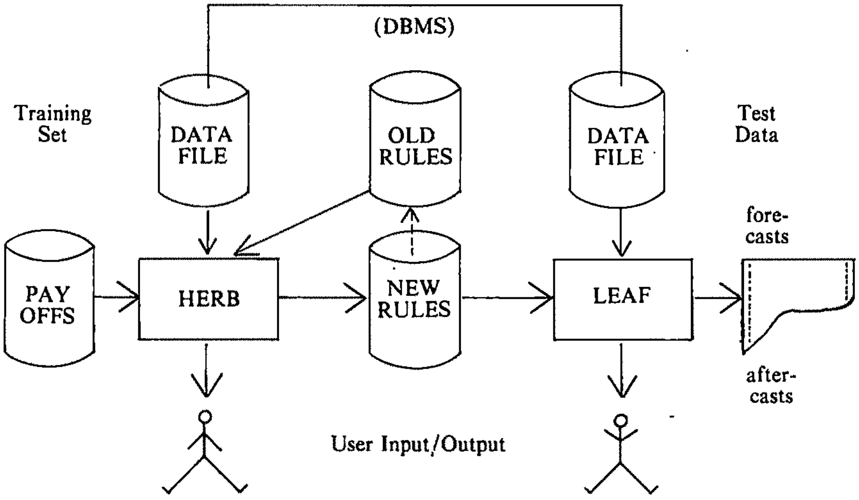


FIG. 2. *BEAGLE synopsis*

HERB requires three input files: a datafile, a payoff file and an old rule file (possibly empty). It produces as output a new rule file which is at least as good as the old one. The datafile contains the training set for which correct category membership is known. The user also has to furnish a payoff matrix which defines the value or cost of each classification or mis-classification.

A rule is represented as a fully bracketted expression ended by a dollar sign, e.g.

((£4 GE 20) OL (£7 LT £8)) $

which states that variable 4(£4) should equal or exceed 20 or that variable 7 should be less than variable 8 to give a true result. (Odd names like OL for OR were chosen to avoid a clash with Pascal predefined symbols.)

LEAF is far simpler. It takes a datafile in the same format as the training set and runs a rule file on it. It can be requested to produce, among other things, an ordering of cases by rule consensus from most likely *Yes* to most

Sample BEAGLE Payoff Matrix

Computer Decision	Actual 1 Lived,	Class 2 Died	
−1 No	−1	+1	for Hospital Admission Data
0 Maybe	0	0	
+1 Yes	+1	−1	

Sample Rule

((61 LESS #14) LE #6) $

Value of variable #14 (urinary output) subtracted from 61 is less than or equal to value of variable #6 (mean arterial pressure).

FIG. 3.

likely *No*. Note that the rules produced by HERB do not require extensive calculation and could in principle be applied by a person. LEAF is merely a convenience.

The BEAGLE learning algorithm consists of repeating the following procedure for a number of generations, where each generation is one run through the training data, as follows.

(1) Evaluate each rule on every sample according to the payoff matrix, with bonus to shorter rules.
(2) Rank the rules in descending order of merit and remove the bottom half.
(3) Replace 'dead' rules by applying the MATE procedure to a pair of rules randomly chosen from the top half, thus combining parts of good rules.
(4) Mutate a few randomly chosen rules (but not the top one) and apply procedure TIDY to all new rules—ready for the next generation.

The TIDY procedure merely cuts down syntactic redundancies such as double negatives, constant expressions and so forth, leaving the pruned rule-tree with the same value but expressed more succinctly.

Tests on hospital admissions (classing heart patients as deaths or survivors) and on athletic physique (classing Olympic athletes as sprinters or long-distance runners) have been carried out. It appears from the trials that the method works better than a standard discriminant analysis technique based on linear functions, and is quite robust in the presence of noisy data. In addition the rather naive Neo-Darwinian theory embodied in the program behaved in a gratifyingly lifelike fashion.

What typically happened was the appearance, and subsequent disappearence, of dominant 'species' of rule. Each type flourished for a while until quite suddenly supplanted by a new and superior line—usually a mutation of one of its own offspring. When this happened the extinction of the more primitive form was rapid and complete. Indeed the value of systems like BEAGLE may in the long run be as tools for helping biologists refine their theories and test their consequences.

At present I am working on a more user-friendly commercial version of BEAGLE which can be 'bolted on' to a database package. The aim is to produce a database that learns.

REFERENCES

1. MICHALSKI, *et al.* A recent advance in data analysis. In: *Progress in pattern recognition.* Amsterdam: North-Holland, 1981.
2. LANGLEY, P. Rediscovering physics with Bacon 3. In: *Proceedings of the 5th International Joint Conference on Artificial Intelligence.* Los Altos: Kaufmann, 1977.
3. MITCHELL, T. An analysis of generalisation as a search problem. In: *Proceedings of the 6th International Joint Conference on Artificial Intelligence.* Los Altos: Kaufmann, 1979.
4. QUINLAN, J. R. *Induction over large databases.* Rep. HPP-79-14, Stanford University, Computer Science.
5. HUNT, MARIN, *and* STONE. *Experiments in induction.* London: Academic Press, 1966.
6. FORSYTH, R. BEAGLE: a Darwinian approach to pattern recognition. *Kybernetes* 10.

© Richard Forsyth, 1984

NEW

Creating an information service

Sylvia P Webb

Setting up an information service, often with little assistance from support staff, can be a daunting task. Recognising this problem, Sylvia Webb has written a practical guide which provides a step by step approach to the tasks involved.

9 checklists enable users to plan an information service most appropriate to their own needs. 4 appendices indicate:

* whom to approach for information
* organisations offering short courses in information work
* suppliers of books, journals and library equipment

ISBN 0 85142 186 5 UK £9.00 (£8.00 Aslib members) Overseas £11.00 (£9.50 Aslib members)

Aslib The Association for Information Management

Aslib 3 Belgrave Square
London SW1X 8PL
telephone 01-235 5050 telex 23667

A 'front-end' system: an Expert System as an online search intermediary

A. S. Pollitt

Department of Computer Studies and Mathematics, Huddersfield Polytechnic

Paper presented at the Aslib and Aslib Informatics Group conference 'Expert Systems: the challenge for information in the '90s?', Royal Aeronautical Society, London, 5 December 1983.

A brief overview of Expert Systems is presented in the context of other computer-based information systems and a description given of the application of certain Expert Systems principles to the design and implementation of a system to act as an online search intermediary. The system, entitled CANSEARCH, is written in Prolog and allows doctors to specify their searches for cancer therapy literature without using a human intermediary and will translate them into legitimate search statements for the MEDLINE database.

Introduction

THE SUBJECT OF Expert Systems under the broader heading of intelligent knowledge-based systems (IKBS) has attracted considerable attention over the last few years and is a central theme in the initiatives of the Alvey Programme for Advanced Information Technology, and the Science and Engineering Research Council IKBS programme[1]. The British Computer Society Expert Systems Specialist Group (BCS ESSG) was established to provide a focus for those concerned with the development of this new area of computing. There are several definitions as to what an Expert System is, one considered definition being that provided by the ESSG:[2]

> An 'Expert System' is regarded as the embodiment within a computer of a knowledge-based component, from an expert skill, in such a form that the system can offer intelligent advice or take an intelligent decision about a processing function. A desirable additional characteristic, which many would consider fundamental, is the capability of the system, on demand, to justify its own line of reasoning in a manner directly intelligible to the enquirer.

The above definition is an extension of the knowledge-handling capabilities which were previously embodied into some computer-based information systems by system designers and programmers, the 'knowledge-based com-

Aslib Proceedings, **36** (5), May 1984, p. 229–234. Printed in Great Britain.

ponent' being written in the various procedural elements of the system. The opportunity afforded by making the representation of the 'knowledge-based component' more explicit, in particular using rule-based or logic programming[3], has made it more possible for system designers to build systems that are capable of more 'intelligent' action than their predecessors.

Expert Systems as information systems

There are three particular aspects to Expert Systems as they relate to information management. Firstly, they provide new mechanisms for *capturing information* in a very immediate and verifiable form with respect to a collection of knowledge elements. To relate this development to the history of publishing would find a parallel with the introduction of the first periodicals which provided a way of recording and sharing findings in a particular subject area. The Expert System, however, can be expected to be a more refined and dynamic means of knowledge capture. Secondly, the use of an Expert System forces a rethink of the methods of *organising and representing information and knowledge* in order to make it dynamic and interactive. Finally, the Expert System should *enable end users to access and question an information collection or knowledge base* without requiring them to learn the procedural expressions required of many current systems. This third aspect can be seen as an extension of the recommendations of the BCS Query Language Group which suggested that no programming capabilities should be required for an end user to query a computer-based information system, nor should the user need to be aware of the physical structure or access methods employed by the underlying database[4]. Similar principles have been adopted for the actual programming task where logic programming is endeavouring to allow the programmer to state *what* the program is rather than determine *how* the program should work, a descriptive rather than prescriptive approach[5].

It is with particular respect to the enabling aspect of Expert Systems that the CANSEARCH intermediary system should be viewed.

The application of computers to the storage, processing and retrieval of information may be classified into three main areas according to the nature of the information and the needs of users:

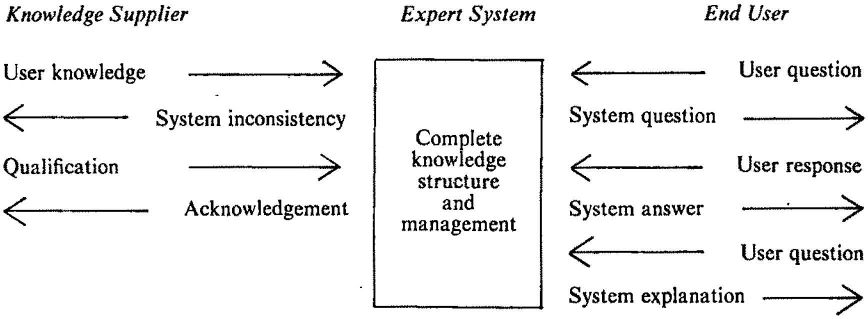
1. Factual/well-structured—typified by the conventional record-based file system and subsequently the database management system. These systems cope with such questions as
   'Which customers owe more than £1,000?'
2. Textual/informally-structured—the typical record in the system would refer to documents or bibliographic references. An example could take a form similar to:
   'What documents do we have on the use of computers in libraries?'
3. Statistical/process-directed—this system is based on specifically coded text and numeric data items for use with well-established statistical routines to cope with such questions as
   'What is the correlation between smoking and cancer?'

Expert Systems have up till now been tackling the third area with the classic Expert System examples of MYCIN in medicine[6] and PROSPECTOR in geology[7]. These systems differed from previous statistical processing in that they were capable of providing a chain of reasoning and were able to respond to more complex enquiries. Because the reasoning was explicit in the programs this made the systems more acceptable for the end user than those which only produced a purely numeric answer.

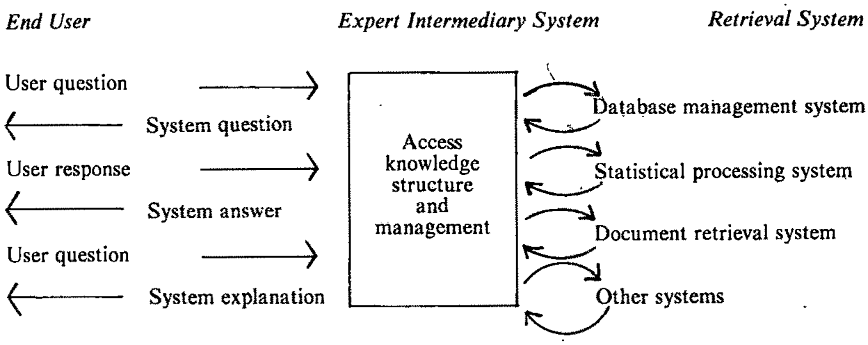
Providing a capacity for explanation may not be unique to Expert Systems, as any computer program may be given this; it is perhaps that it is built into the programming methodology that provides the distinction.

The application of Expert Systems

The application of Expert Systems may be divided into two types. Firstly, as the direct store of knowledge which is required by an end user. Possible dialogues for the capture and update of knowledge and subsequent questioning are represented in the following:



Secondly, as the means of access to information or data stored elsewhere, where the capture and update takes place in the 'remote' retrieval system. A possible dialogue is illustrated by the following:


End User
Expert Intermediary System
Retrieval System
User question
System question
User response
System answer
User question
System explanation
Access knowledge structure and management
Database management system
Statistical processing system
Document retrieval system
Other systems

The CANSEARCH system

A specific example of the second type of application is the CANSEARCH system which acts as an intermediary for doctors to aid in their searching for cancer therapy literature.

The knowledge in CANSEARCH

The knowledge held in this intermediary system can be placed under several headings:

Subject = Cancer and Cancer Therapy

Indexing = Medical subject headings
Indexing manuals

Retrieval System = MEDLINE/BLAISE
(currently limited to the generation of legal search statements)

Searching = Recall/Precision/Specificity/Exhaustivity

User = Journal preference
Previous searches
(not provided in the current system)

Environment = Locally available publications
(not provided in the current system)

Early ideas regarding such an expert intermediary have been published elsewhere[8].

Examples of the knowledge held include:

Cancer and Cancer Therapy

> Cancer has a primary site and may spread to one or more secondary sites ... treatment is by surgery, chemotherapy, radiotherapy or by a combination of treatments ... Cancer may be identified by the type of cell ...

Medical subject headings
(the controlled vocabulary and thesaurus used by indexers and searchers)

- GASTROINTESTINAL NEOPLASMS
  - INTESTINAL NEOPLASMS
    - CECAL NEOPLASMS
      - APPENDICEAL NEOPLASMS

MYXOSARCOMA
C4.557.499.663
coord with pre-coord organ/neoplasm term (IM)
MYXOSARCOMA OF BREAST = CYTOSARCOMA PHYLLODES

Knowledge representation

Knowledge in CANSEARCH is held in a combination of statements and rules.

The *statements* include an edited subset of the medical subject headings which is presented to the searcher for concept and term selection. The experimental system currently uses a touch terminal to allow the end user direct selection but the design philosophy could be implemented using a 'mouse' or, less directly, using numbered elements for user selection by a numeric key pad. The use of the MeSH thesaurus is described elsewhere[9]. (This was fully demonstrated using a videotape of sample searches during the actual presentation of this paper.)

Rules are used for the selection and display of frames of concepts and terms, and also for the search statement generation. All rules refer to selections and/or blackboards, where the blackboards represent the build-up of the search specification.

The components of the system may best be described by FIGURE 1 below.

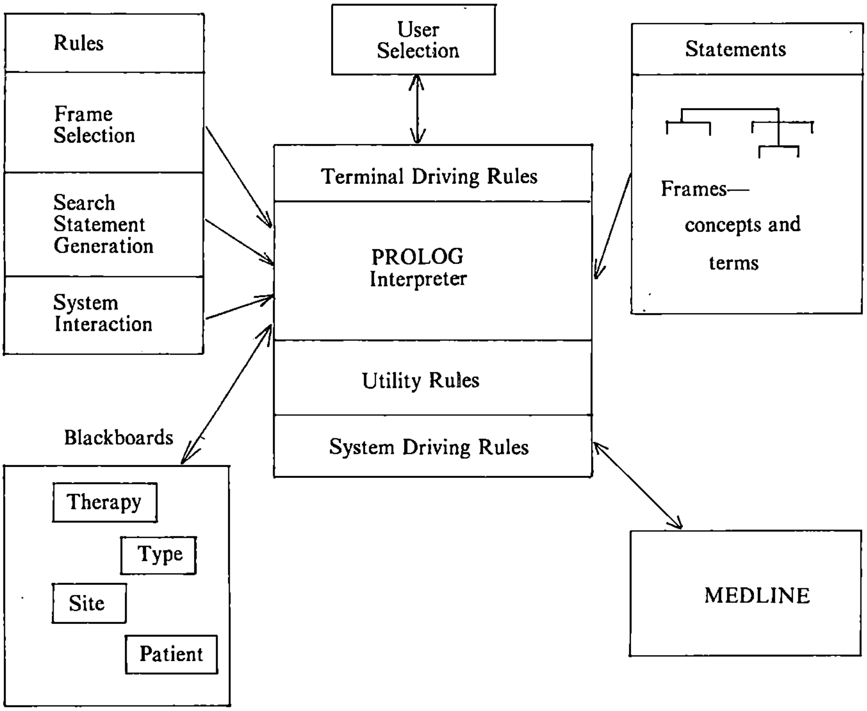


FIG. 1. *Components of the CANSEARCH system.*

Implementation

An earlier version of CANSEARCH was programmed using Micro Prolog on a Research Machines 380Z microcomputer[10] where an initial program design was tested. The current system is written in Portable Prolog (York University) and runs on time-shared PRIME 750 minicomputers. The Prolog program contains over 3000 lines holding more than 40 different display frames with 20 frame selection rules, between 2 and 15 rules that are activated after the selection from any one particular frame, and 35 rules to handle search statement generation. The system has been installed at the Oncology Information Service in the Medical Library at the University of Leeds and is due to be tested under experimental conditions early in 1984.

The system is capable of generating legitimate search statements to cope with a great variety of different potential query forms and is expected to perform well in the experiment which is being conducted in collaboration with the MEDLARS section at the British Library, Boston Spa, and the Oncology Information Service.

ACKNOWLEDGEMENTS

Thanks are due to all those who have helped to bring this concept to life. A special mention is due to Julian Kowzan and the staff at the Audio Visual Services at Huddersfield Polytechnic who made the videotape of the system shown during the presentation of the paper, which, alas, is all too impossible to reproduce with this published paper.

REFERENCES

1. SPARCK JONES, K. Programmes in advanced information technology. *Journal of Documentation,* **39** (2), June 1983. 85–87.
2. BRITISH COMPUTER SOCIETY EXPERT SYSTEMS SPECIALIST GROUP. *Newsletter,* July 1982.
3. DAVIS, R., *and* J. KING. An overview of production systems. *Machine Intelligence,* **8,** 1977. 300–332.
4. BRITISH COMPUTER SOCIETY QUERY LANGUAGE GROUP. *Query languages, a unified approach.* Heyden, 1981.
5. CLOCKSIN, W., *and* C. MELLISH. *Programming in Prolog.* Berlin: Springer Verlag, 1981.
6. SHORTLIFFE, E. H. *Computer based medical consultations: MYCIN.* Elsevier Computer Science Library, 1976.
7. DUDA, R., GASCHNIG, J., *and* P. HART. Model design in the Prospector consultant system for mineral exploration. In: MICHIE. D. (ed.) *Expert systems in the microelectronic age,* 1979. pp. 153–167.
8. POLLITT, A. S. An expert system as an online search intermediary. In: *5th International Online Information Meeting.* London: Learned Information, 1981. pp. 25–32.
9. POLLITT, A. S. A search statement generator for cancer therapy related information retrieval. In: *6th International Online Information Meeting.* London: Learned Information, 1982.
10. POLLITT, A.S. End user touch searching for cancer therapy: a rule-based approach. 6th International ACM SIGIR Conference on Research and Development in Information Retrieval, Washington, June 1983.

Developments in Information Technology: an overview

Peter L. Gillman

Specialist in Information Technology,
Aslib Research and Consultancy

Paper presented to the ICI Scientific Society, 7 March 1984.

Introduction

Last Christmas my daughter received a book as a present. There is nothing apparently noteworthy about that, but this book is different. She is the heroine of this story; the other characters bear the names of her friends; and the action all takes place in our home and neighbourhood. All that we, the parents, had to do, was to supply the publishers with the appropriate pieces of information, and a word processor looked after the rest.

Should I so wish, I can buy a computer to fit to my bicycle. This will tell me my average speed, total and trip mileage, elapsed time, and cadence, or pedalling rate. The computer costs about £25, is the size of a cigarette pack, and the batteries for it cost an eighth of the price of the computer.

The next generation of video games will, we are told, integrate microprocessor power and home video-recording, so that the character zapping the Klingons on the screen is the actual player — the ultimate in vicarious adventure, at a safe remove from reality.

Those three random examples are, I suppose, all manifestations of Information Technology in action. What has made them possible — their desirability is a question for later discussion — is the mass production of cheap microcircuitry. It is a nice point as to whether the sort of applications for which computing power is being sold today have been defined by users, or determined by marketing men looking for new pastures to sow with the seeds of their fertile imaginings. It is an old question — the extent to which inventions answer needs, or generate them.

Nearly two decades ago, a group of experts in various disciplines of automation, set out to speculate on what future developments in the field might be. Among other things they supposed[1] that

1. by 1975, or 1980 at the latest, there would be direct links between shops and banks, to check credit and process transactions;
2. by 1978, or 1984 at the latest, there would be automatic libraries looking up and reproducing hard copy from electronically-stored full text;

Aslib Proceedings, **36** (5), May 1984, p.235–244. Printed in Great Britain.

3. somewhere between 1982 and 1988, the first LSI (Large Scale Integration) processor chips with densities of 10,000 elements per square inch, would be produced.

Hindsight lets us see those predictions as somewhat naive. They were the result of trying to determine what would be desirable, rather than what the market would demand.

The reality is this:

1. Only now are direct credit-checking systems becoming available — automatic crediting and debiting of accounts is still experimental. It was announced while this paper was being prepared, that IBM and British Telecom are to release EFTPOS (Electronic Funds Transfer Point of Sale). This system will immediately perform the necessary debits and credits from the retailers' till, with no more 'three days grace' while a cheque is cleared.
2. Although there are many hundreds of databases allowing searching and retrieval of bibliographic references, there are no services which store full text in any significant volume.
3. In 1982 an LSI processor chip was produced, which had an element density 450 times greater than that predicted.

There are many definitions of Information Technology. Mostly they vary in the breadth of equipment and applications which they encompass. A working definition for our purposes is one which covers the acquisition, storage, processing, retrieval, and display of information by electronic means. Within that broad sweep we can therefore include anything from the desk-top computer on which this paper was originally composed, through to a numerically-controlled machine tool, by way of the digital watch. But what is the technical drive which has made these various devices possible? There has always been a human desire to count and quantify things, and the corollary of enumerating is that people are not very good at it. They may count accurately, and then forget the figure. So along with the counting, has gone the need to store and remember. And once you have a device which can remember, even if it is the humble sheet of paper with writing, then you have the possibility of synthesising the raw data into information by adding other bits of data to it.

Out of all this activity were born the early attempts at mechanical computation, and then electromechanical devices as the defects of the purely mechanical approach became manifest. That technology too gave way in time to the purely electronic devices of today.

People and work

It is axiomatic that any device 'guaranteed' to 'solve all of your problems' will do nothing of the sort — it may perhaps remove them in order to substitute newer ones which ride in on the coat-tails of the new technology. The first industrial revolution became justified by its apologists as a means of liberating mankind from the shackles of poverty. In some ways this did happen — by earning money through selling their labour, people were able to consume some of the goods which they produced. But this production and consumption was often seen to be at the expense of an idealised agrarian freedom.

In much the same way, the widespread application of IT is being seen by some as the ultimate and universal panacea for all ills. One of the IBM 'motherhood statements' (ie one which you may not question) is that machines should work, and people should think. Perhaps this is a good point at which to make a diversion to explore in terms of employment numbers, the possible consequences of widespread office automation. A German estimate is that there will be an overall decrease in clerical employment of 40 per cent by 1990. A French estimate for the financial sector is that within the next ten years there will be a 30 per cent decrease. A Danish estimate is that word processors alone will cause 75,000 office jobs to disappear within the next few years.[2]

Various estimates have been made of the manner in which the information revolution will affect the nature of jobs. One such, from the American Bureau of Labour Statistics[3] plots the underlying trends from 1860 to the present. In percentage terms, the number of non-information workers in the US economy has dropped from around 95 per cent of the total labour force in 1860, to between 45 and 55 per cent in 1980. Over the same period the number of information workers has risen in a mirror-image curve from 5 per cent to between 40 and 50 per cent.

If all of those jobs are to go in order that the machines can work, then what will the people think about? I do not intend in this discussion to get involved in the human consequences of automation, because that is a task for the social scientists. It is enough to realise that the information revolution is going to be responsible for a fundamental restructuring of society, and that this process will not just involve the office, but the factory, the home, and every aspect of endeavour either directly or indirectly.

The pace of technical change

In the early 1960s, an IBM 2311 disk drive held around 7.25 million characters at a price of 0.4 cents each. My own computer at home will store 173,000 characters on a floppy disk costing £3.00, ie 0.0017 pence each. This phenomenal difference (which represents a decrease in real terms of some 250 times) is only one way of looking at how costs have tumbled.[4] 'Science and the Citizen', in *Scientific American*, January 1982, contained some interesting observations which I would like to quote:[5]

> In the manufacture of microelectronic devices, the area on a silicon chip required for a given function has been shrinking by a factor of 2 every 18 months. The cost per bit of microelectonic memory has been falling along a roughly parallel curve.

The article then continues by pointing out that the fabrication technologies are just about to reach the limits of resolution required for any further shrinkage.

But all is not lost — we are then told that new fabrication methods are likely to increase the device densities by a factor of 3000. We are therefore in a very real sense approaching the ultimate (as far as it can be known) building-blocks of matter. These new fabrication methods involve exotic and fantastical techniques of atomic manipulation because that is the level at which devices will have to be constructed and interconnected.

Interconnection is of course the problem. The smaller and more dense the chips become, the more complex does the mechanism for connection have to become, because wiring will no longer suffice. The closer devices are placed together on a chip, the faster they can act. The faster they act, the more rapid does any use of the devices become.

Another way of looking at the pace of change, is to note how the price of machinery has moved against the price of employing people. One study[2] suggests that over the last decade, office productivity has increased in the US by only 4 per cent, while over the same period industrial productivity nearly doubled. Wages in the UK account for around 80 per cent of all office costs. Against this, the price of office automation equipment has been dropping by about 10 per cent per annum, and the performance of computers has increased 10,000-fold in 15 years.

When computer systems were simpler, so was the documentation to run them. The installation manual[6] for the IMB 1410 of 1961 (one of the earliest commercially available business computers) came in one volume of 480 pages. For an equivalent machine today, the documentation would probably run to nearly as many individual volumes. That early IBM manual is only just slightly thicker than the manual for VisiCalc which I run on my own micro.

At this point we have to revert to a stone, or at least an agricultural age. For having processed our information at almost unimaginable speed, it has to be transmitted, displayed, or in some other way made known. There is a gross mismatch between the speed with which a kilobyte of data can be sent to a printer, a disk drive, or even down a telephone wire, and the speed with which the microprocessor is able to handle and reshape that data. Much of the time the processor is in fact ticking over doing little more than wait for the next event that requires its power. The output and input systems available just do not match up to the machines to which they are connected.

The people problem

Yes, people are a problem. They are erratic, brilliant, deductive, stupid, forgetful, moody and creative, though not usually all at once. Machines operate in an environment of cold logic, unthinking precision, and pedantic exactitude. There could hardly be two less likely things to throw together in order to carry out a job, than a machine and a person. And yet the mix works, inasmuch as the human makes all the concessions. You might think therefore, that the interfaces — the points where man meets machine — would be made as flexible and adaptive as possible, but not so. Anyone who has used a personal computer will know the feeling of utter hopelessness and frustration engendered by a machine which has locked itself up, refuses to operate, and cannot or will not tell you why.

Forget to load a disk, or to close the disk-drive door, and you see on the screen the video equivalent of a slap on the wrist, followed by the almost audible 'crashing' of the program you are trying to run. You would think that with all that power around, the computer could at least suspend the program, diagnose the problem, and invite you politely to intervene. Similarly, when I call for a program to be loaded from disk, I do not think it too much to ask that the computer should search both of the active disks in order to find the program, and then load it. As any user will know, the answer, if the correct drive for the program is not exactly specified, will be another crash. A crash, for those not yet up in the jargon, means that execution of the program terminates, data is lost, and the installation reverts to its native state of non-compliance.

Much effort is being expended today on improving those interfaces — making them both more robust and more friendly. In line with this work, studies are also taking place into the variety of ways that operators interact with screens and keyboards. This includes the ergonomics of machine design, but also things like acceptable response times, and optional help and guidance displays.[7]

A view into the future

I think that we have now reached a position from which it is possible to speculate on what the near future holds in the way of technical developments, and what some of the consequences of those developments might be.

Progress will not be stopped, where progress means movement forward regardless of its desirability. As long as there are potential consumers for products, there will be manufacturers and packagers of those products, which will be made ever slicker, faster, more attractive and powerful. It comes as something of a shock then to realise that most of the development in computing is aimed at the hardware, and not the software. A common criticism levelled at IT82 — the year supposedly devoted to information technology — was that it was all T and no I. Aslib seemed at times like an Old Testament prophet crying in the wilderness: 'Don't worry about how much you can store, or how fast you can move it: worry about whether you ought to be handling it at all'.

A paper given at the Aslib Annual Conference in 1982[8] summed that last point up rather well: the author described a word-processing establishment in the San Francisco branch of a large US bank. One hundred and ten WP operators were seated in serried ranks — no talking, smoking or eating were permitted, and even visits to the toilet were timed and logged. In this high-tech implementation of the archetypal Dickensian office, the operators were expected to realise keying speeds of up to 12,000 keystrokes per hour. Somehow it reminds me of the infinity of monkeys seated at an infinity of typewriters, in an effort to write the whole of Shakespeare's output by random chance. Consider, if you will, how many words each day that volume represents, and how many trees are pulped to carry the output. Is this what the new technology holds for us?

So perhaps as computers become commonplace and some of the excitement goes out of them, we will see more users prepared to stand back from their hand-crafted databases and seriously question not only the appropriateness of constructing them, but also the quality of the stored information.

On the hardware front there will be enormous changes. I would not like to be quoted in 20 years' time on the naivety of my own speculations, and so I am going to confine them to concepts, and not how those concepts might be realised in hardware.

Firstly, the much-vaunted Japanese drive for the Fifth Generation. The essential idea here is to make machines which embody a degree of intelligence, albeit of a highly artificial nature. Expert Systems will be the order of the day and will employ inductive and deductive 'reasoning' when manipulating data. This sort of effort will require software unlike anything commonly available today, based as it is on the classical Van Neumann machine which employs a stepwise 'one thing at a time' processing structure. That thought leads to the next logical development: machines which will not only run several programs at once (concurrency) but carry out a multitude of steps in the same program at once.

Parallel processing, as this concept is known, is heavily in demand in those applications which involve complicated calculation on highly structured data, such as large matrices. One of the most obvious applications is in weather-forecasting, and many others suggest themselves. Such parallel processors already exist, but they are embryonic in terms of likely future products.

Processing vast masses of data of this sort immediately calls into question the technologies which we currently use for storing and transmitting it. Mass storage devices in the gigabyte and terrabyte ranges — respectively US and UK millions of kilobytes — will probably not be denser implementations of the present magnetic systems. It is far more likely that they will be optical, using lasers to read and write optical disks, and optical fibre cables for transmission.

Standardisation, or rather the lack of it, has always plagued the DP industry. Any two makes of computer may share the same operating system, but the chances are that they actually use dialects of that system, and further, that the storage medium of one will not be capable of being loaded on to and read by the other. It is probably much too late for this dilemma to be resolved, and in a way it really does not matter any more. If the computers can be interconnected memory–to–memory, then direct transmission can take place. There are many versions of networks now available, but on the whole they work best when only similar makes of machine share the network. The obvious development here is for networks which take the 'black box' approach to interconnection, and will tolerate any type of device provided it transmits recognisable code.

In line with the provision of true mass storage and 'black box' networks, we may be able to see the approach of the paperless office, although my feelings incline much more towards the less-paper office. Office automation is a fine idea, which at present works only for the office generating the information. As long as all incoming documentation is on paper, we will need the cumbersome technologies of digitising or scanning in order to reduce it to an electronically manageable form. Electronic mail in widespread use will overcome this, and the tentative beginnings are here already.

Low-cost, high-capacity, and rapid-retrieval mass storage systems are going to be one way to unlock the true potential of electronic systems in offices. Researchers may today search through any of the 1800-plus bibliographic databases accessible online through European host computer systems. But what is retrieved does not really match up to the requirements of the search. The output is normally in the form of a reference which may have a brief abstract attached, or perhaps a set of keywords. The search itself may be of the highest quality, but its completeness in terms of the retrieval of all relevant documentation depends on the indexing breadth of the individuals preparing the material for the database.

Any journal title which is abstracted by two or more database providers will almost certainly be treated differently by each, to the point that there may be no common keywords at all for the same piece of basic text. So the chance of retrieval under any particular search strategy contains a large element of luck. If, however, the full text of a document can be stored routinely, and the whole text (which is, after all, in the author's own words and own terminology) can be searched, then providing the author has used the right wording, the document can be retrieved.

That may all seem of academic interest compared to the real benefit to be gained. Today, a literature search may take two hours, and yield perhaps 200 references, and these can be printed out locally. But obtaining hard copy (ie, printed full text) may take anything from a day to several weeks. Full-text searching will mean that the retrieval process also becomes the document delivery process, and promises to overcome one of the thorniest problems in information work.

It does not require a great deal of analysis to see that if the promise of the preceeding remarks is fulfulled, then librarians with their cherished expertise in documentary organisation are going to have to look to other fields of endeavour in the information world for their daily occupation. This has already happened in publishing, and has been the cause of much stress and tension in the newspaper industry. The traditional pattern there has been for the journalist to gather the story, various editorial levels to massage it into readable shape, and typesetters to render it into printed form. Many old-established crafts have been involved in this process.

The new technologies cut right through that picture. The journalist still has to get his story. With a portable terminal he can compose the text on the spot, and transmit it through the telephone network to his paper. There it is received and stored until one of the sub-editors calls for it on the screen. Here all of the cut-and-paste takes place, with the sub viewing the story in its full context, since it is contained in an image of the final page. Once the page is complete, the entire image is sent to a photocomposer, the output of which is a printing plate, ready to go to the press. Our Fleet Street unions have — perhaps understandably — been extremely reluctant to let this kind of technology gain a toe-hold. The experience in the US has tended however to show that ultimately these developments are not only irresistible and inevitable, but also beneficial. Many North American papers are now produced this way, and instead of having single daily issues, are actually publishing around the clock.

ENG, or Electronic News Gathering, has proved to be another threat to the technicians of the broadcast media. It is obviously an alluring prospect for a news editor if he can send out one reporter equipped with a lightweight video and sound recorder to cover events as they happen. News materials can then be inserted into a broadcast as soon as the taped material can be transmitted to the news desk. No editing need be done, and there is likewise no need for the camera and sound crew who usually accompany a television reporter. No film to process in a darkroom, and the reporter is more mobile because he is travelling light and alone.

Electronic publishing is a term encompassing the process of creating, editing, storing, transmitting, and receiving textual material with the minimum of intervention. Text can be captured from a word processor, and stored for retrieval and delivery in some mass storage device. The text may only appear on paper twice at the most — firstly as an authors' draft or rough notes, and secondly when the ultimate user chooses to print it off on a local printer. You will have noticed that there are many features in common with the newspaper example. A number of experiments of varying degrees of success have explored this area, and there are a few electronic journals available. More will surely follow.

Last year it was reported that as a challenge, an American author produced an entire 19-chapter novel from writing to completed publishing in just 72 hours. It was a stunt of sorts, but also put down a marker for future developments. In a similar vein, Arthur C. Clarke, no mean exponent of the future which he explores, writes his work from his home in Sri Lanka, and passes the text via a communications satellite to his American publishers. They make alterations and add notes, send the text back the same way, and receive it again after amendment.

Work in the future

Authors are idiosyncratic, and there have been famous instances of publishing houses who never met their best-known writers, so perhaps we ought not to attach overmuch weight to that example. But if a writer can carry out his work halfway around the world from his publisher, this is surely saying something about the likely pattern of work in the future.

Consider your own working patterns. Perhaps you work some form of flexible hours, which allows you (in theory at least) to arrange each working day to your best convenience. Nevertheless, you will spend on average around 1 hour to 40 minutes each day simply getting yourself to and from work. Snow, rail strikes, and motorway maintenance all serve to increase that from time to time. You may be able to read whilst on a train, or compose brilliant mental memos while driving, but it is actually your own discretionary time which is thus occupied.

Let us imagine now a scenario of the not too distant future of work. Instead of leaving home for the office, the office is your home. A microcomputer with comprehensive communications facilities and a range of standard software — graphics packages, spreadsheets, word processors, retrieval systems — has been logging in transmissions from your colleagues and clients while you were asleep. In its turn it has been transmitting your reports and correspondence, updating bases of sales figures, culling stock prices, and monitoring the movement of your market sector.

You log on to the system, and read a series of messages. One may tell you how many pieces of electronic mail await your attention. Another will let you know that the days' selection of news stories is ready for scanning. Another lists appointments which you have made, and which other people have made for you.

I do not want to pursue that particular Holy Grail to its ultimate resting-place, because a large question is looming up. It will not get an answer from me, but it will have an airing, and its implications will have to be worked through by all of us.

Think of the office in the home. Do you want to, or could you manage to work well there, isolated from your workplace?

Many of us, I suspect, need the discipline of a structured office environment. We also like to meet different people, and to interact with them. And behind those considerations comes The Question. An enormous number of people working throughout the world, do nothing creative at all. They are handle-turners, processing and passing on the creativity of others. Secretaries, clerks, even middle management fall into this category. When machines are doing the processing, the passing on, what will the people do?

Well, I believe that they will be able to realise their real potential as interpreters. Machines can store transmit, and reshape data into information. But I believe that we are many years off even the glimmerings of technologies which will be able to reason; to make the inductive leaps at which the human brain is so good. Some years ago a large (and nameless) corporation produced a generalised computer-based modelling system which would simulate numerically the performance of any complex system which could be described to it. Among other problems put to it, was the flight duration of a four-engined aeroplane under various conditions.

The output showed conclusively that for a given journey of four hours' duration, if one engine failed, the trip would take 5 hours. Two failures = 6 hours. Three failures = 7 hours. Four failures (simple!) = 8 hours!

As long as we can appreciate the rich absurdity of mechanical logic, I think there is hope for us all.

REFERENCES

1. SMITH, I. No Future in Prediction. *The Guardian*, Thursday 15 December 1983. 9.
2. MORGALL, J. Typing our way to freeedom: is it true that new office technology can liberate women? *Behaviour and Information Technology*, **2** (3), July – September 1983. 215–226.
3. *Information Technology Training*, November 1983. 166. Review of Simpson, A. *The office of the future.*
4. HOLLAAR, L. A. The Utah Text Retrieval Project. *Information Technology: Research and Development*, **2**, 1983. 155–168.
5. Science and the Citizen. *Scientific American*, January 1983. 67.
6. *IBM Customer Engineering 1410 Data Processing System Manual of Installation. Form no. 225–6549.* IBM Corporation, 1961.
7. BROPHY, P. 'Help' screens and talking to the computer. *Library Association Record,* **86** (2), February 1984, 61–64.
8. DOWNING, H. On being automated. *Aslib Proceedings,* **35** (1), January 1983. 38–51.

Proceedings of a
Conference of the
Aslib Biological and
Agricultural
Sciences Group

JUNE 1982

COMPUTERISED SYSTEMS IN LIBRARY AND INFORMATION SERVICES

Editor:
H L Williams

Few institutions have been able to afford mainframe computers specifically to run their internal library or information services, but some have been able to run in-house services using spare capacity on mainframe installed for other purposes, and the advent of the microprocessor has allowed the development of small but powerful computer systems which many information managers can afford. The availability of these new computer systems has stimulated the development of many software packages which are particularly suitable for use by small libraries and information units. Agricultural and biological libraries and information services are no exception to these trends, but Aslib Biological and Agricultural Sciences Group recognised that there were many small library and information units in the UK which were under-informed about current thinking and developments relating to these new systems. This Conference set out to try and reduce this problem by highlighting the experiences of established users of mainframe and microcomputer technology.

ISBN 0 85142 169 5 1983
UK £8.00 (£7.00 Aslib Members)
Overseas £9.50 (£8.00 Aslib Members)

Aslib Publications
3 Belgrave Square
London SW1X 8PL

Informatics 7

Intelligent information retrieval

Edited by Kevin P. Jones

Proceedings of a conference held by the Aslib Informatics Group and the Information Retrieval Group of the British Computer Society, Cambridge 22-23 March 1983

Is there evidence of progress towards artificial intelligence? The pioneers of computing rapidly grasped the apparent potential which their technologies offered in this direction, even though the hardware and software then available were crude by comparison with that currently available for home computing; in the 1950s, Luhn was advancing algorithms for automatic abstracting and indexing, and others were heralding the advance of machine translation. By the standards of this early promise, the harvest of the early 1980s should have been vast, and such processes as much the norm as electronic calculating is today.

We know that this is not yet the case, but the papers included in *Intelligent information retrieval* do lead towards a cautious optimism. Commercial organisations as well as research projects are starting to operate intelligent information retrieval systems; and although problems remain, systems are being developed which will be of great value to all who have to handle large amounts of text in machine-readable form.

296mm x 210mm 149pp 1984

ISBN 0-85142-187-3
UK £14.00 (£12.00 to Aslib members);
overseas £17.00 (£14.00 to Aslib members)

The Association for Information Management

Aslib 3 Belgrave Square
London SW1X 8PL
telephone 01-235 5050 telex 23667

21 MAY 1985

Aslib Proceedings

VOL. 36 NUMBER 6 JUNE 1984

Information management: a practical view 245
Peter Vickers

Aspects of referral 253
John Martyn and Glenda Rousseau

The subject librarian and social scientists: liaison in a university setting 269
A. Holbrook

Alternative careers for library-information workers 277
Margaret Slater

ISSN 0001-253X

ASLIB PROCEEDINGS

Volume 36 **JUNE** **Number 6**

Aslib Proceedings carries papers given at Aslib meetings and conferences, and contributed papers of interest to practising professionals. These describe innovations in information management techniques, applications of existing information products and services, and case studies of information units and special libraries. The contents of the journal are reviewed by an editorial board.

Aslib Proceedings is published monthly and supplied free to members of Aslib. Annual subscriptions to non-members: £50 (UK)/£60 (overseas); additional subscription to members: £30/£35. Single copy prices and subscription information are available from the Subscriptions Department, Aslib, The Association for Information Management, 3 Belgrave Square, London SW1X 8PL.

Manuscripts and editorial enquiries should be addressed to the Editor, *Aslib Proceedings,* Aslib, The Association for Information Management, 3 Belgrave Square, London SW1X 8PL. Manuscripts should be 1,000 to 3,000 words, typewritten, double-spaced, single-sided on A4 paper. Figures should be reproducible. An abstract of up to 200 words should be included. References should follow British Standard 5605:1978. Published authors will receive twenty-five free offprints of their article.

Advertising information is available from the Editor, as above. Further information about Aslib's services and membership rates will be supplied on application to the Director, Aslib, The Association for Information Management, 3 Belgrave Square, London SW1X 8PL. Telephone: (01) 235 5050; telex: 23667 (answer-back Aslib G).

© 1984 Aslib and contributors **ISSN 0001 253X**

Information management: A practical view

Peter Vickers

Information Management Projects Unit,
Aslib

Information what?

THE EXPRESSION 'information management' has been around for some time, but at last it seems to be catching on in a big way. It features increasingly in the titles of papers in the literature of information science and librarianship (see for example the programme for the 1984 Aslib Conference), and that of management. New journals and new textbooks on information management are proliferating. Courses in information management are being offered at certain universities and at least one business school. Last year, Aslib changed its name to become the Association for Information Management. It would appear that IM has well and truly arrived.

Unfortunately, the concept has gained currency before acquiring much substance, and it would be more true to say that several kinds of information management have arrived at the same time. A certain amount of confusion reigns as various professional groups try to attract favour for their own particular brand of IM. The librarians and the information scientists, the information technologists, the computer experts and the records managers—all have their own views.

This paper is an attempt to express Aslib's current interpretation of information management. As a starting point, it will look back on the way that IM has taken root in Aslib over the past few years. It will then discuss some of the implications of good information management in different types of organisation; consider who are the information managers of the present and the future; and attempt to outline the body of knowledge that will go to make up this new discipline.

How IM came to Aslib

Looking at the evolution of Aslib over the past fifteen years, one can see a certain inevitability in its growing involvement in information management. Aslib can survive only if it is useful to its member organisations. So long as Aslib could only help the library or the information service, rather than the organisation as a whole, its usefulness and observed value was always restricted. This has become increasingly serious in recent years, when member organisations have been reducing their commitment to internal information services in the face of economic pressure. The spending power of our traditional market was shrinking, so there was little scope for the development

Aslib Proceedings, **36** (6) June 1984, pp. 245–252. Printed in Great Britain.

of new products and services. Rather than incremental growth, some kind of quantum leap was necessary to ensure Aslib's future prosperity.

This need to extend our boundaries had been reinforced in other ways. It had become evident to those of us in the research and consultancy part of Aslib that the expertise gained through research could have limited impact so long as it was applied only to conventional library and information services. Slowly at first, but with increasing alacrity in recent years, we have accepted new challenges and undertaken projects relating to information system problems on a much broader front, in all kinds of organisations. Almost involuntarily, we found ourselves accumulating experience and establishing credibility in the wider world of information management.

So the demand was changing, and Aslib was quietly extending its skills. Meanwhile, the world around us was changing too. The need for information management had always been there, long before computers arrived on the scene. The statistics of the so-called information explosion, so maddeningly reiterated throughout the 1950s and 1960s, began to inspire an awareness that information was Something Big. Changes in the characteristics of industry, and the growing proportion of the population employed in service industries and in information-related work as compared with manufacture or agriculture, all combined to create an environment in which information management could take root. Then along came Information Technology, and the plant was established. IT has forced a realisation that information systems have to be taken seriously, and that something better than an amateur approach is needed to take advantage of the benefits that IT offers, and at the same time cope with its complexities. There is also, thank goodness, a (slightly delayed) recognition that information technology is about information as well as technology.

Many managers today are living through the introduction of word-processing, and the more enterprising contemplate forays into more advanced forms of office automation. These experiences seem to bring home quite quickly the lesson that there are (or should be) connections between many of their office systems, and their management information systems, and their marketing intelligence and technical information systems, and so on. At this point, they begin to think, whether they like it or not, in terms of information management.

The experience of consultancy

Indications of the need for proper information management and the penalties of not having it have emerged from many of our research and consultancy projects over the years. At a general level, we have repeatedly come across examples of organisations where information systems are totally compartmentalised, and usually set up in their respective departments by enthusiastic amateurs who devote much energy to re-inventing the basic principles of classification and indexing. These alone convinced us long ago of the need for a professional, corporate approach to the design and management of information systems, deploying specialist knowledge where needed.

All too often, the solutions that we have been able to offer in the past were not ideal, simply because of the difficulty of finding the right kind of people to implement them. For example, about seven years ago, an industrial firm commissioned us to advise them on the development and integration of all their information systems. We were able to put forward a sound plan of action for the design and implementation of better systems, but it proved extremely difficult at that time to find a suitable person, with the right mixture of information science, computing and management skills, to take on the responsibility for this complex of systems. The task would not be much easier today.

A recent project for a nationalised corporation illustrates another classic effect of inadequate IM. Because the quality of existing information services at different sites was variable, and in some cases very deficient, many local information resources had been set up, over and above the formal network. These 'pirate' units are funded by their parent department or section, but inevitably result in an inequitable distribution of information resources. The overall picture of information provision within the organisation was consequently distorted. At the same time, although there was a lurking suspicion among top management that expenditure on libraries and information services was inefficiently controlled, there was no adequate system for monitoring such expenditure. Nearly every unit was the responsibility of a separate parent department, and no overall analysis was possible.

Concern regarding the cost-effectiveness of information services has been an important stimulus to the evolution of our IM thinking. Often in the early 1970s, we were asked to advise on how to make special libraries or information services cost-effective. In most cases, an interview survey of selected users was carried out. Time and again, this revealed that the most serious information problems were not those of the library or information service, but those of

ineffective systems for storing and providing access to the organisation's technical and commercial experience;
chaotic departmental or personal filing systems;
inadequate management information systems;
poor communication within the organisation.

It was also evident that expenditure on library/information services (which were often run by professionals) was often quite modest in comparison with the cost of these other systems (which usually were not). With increasing experience, we were able to argue with conviction that the benefit resulting from improving one information system (such as a technical library) in isolation would often be marginal, and that more impressive results could only be achieved if a group of related systems was treated as an integrated whole.

Work in large governmental organisations has taught us a great deal about the importance of proper information packaging, and we would regard this as an essential element of good information managment. As an example, we were called in to advise one such organisation on how to improve the flow of information from its headquarters to its regions and districts. A fundamental problem here lay in the design of the documents used to convey the information. These ranged in purpose from regulations through to codes of practice and standards, and on to items of general information, and their function was often unclear. As a result, there was confusion about the systems by which the information should be disseminated, stored and later retrieved.

Attacking the information problems of large organisations calls for proper investigative techniques to map information flows, and to analyse the resulting data. Such techniques were needed, for example, when we were commissioned, in 1982/83, to advise the National Health Service on a strategy for the introduction of information technology. Such techniques should not be the monopoly of researchers and consultants, but part of the information manager's tool-kit.

The same project can serve to illustrate other important lessons. The strategy for the introduction of IT in the health service had to take into account several factors, of which the most important were:

- the existence, and pace of development of other computer systems within the organisation;
- the funds available for obtaining the necessary hardware and software (which will vary from one Health District to another);
- the pace at which the staff concerned could accommodate radical changes to their way of working, while still coping with their normal workload.

Knowing this, and applying this, is all part of information management.

Information management and organisation types

Some of the textbooks on information management pronounce on the subject as though all organisations were the same, and all should apply the same principles. This may be very well in theory, but in practice the problems and the responses must inevitably be different. This whole area is sadly under-researched, and what follows is no more than broad generalisation.

Many large industrial organisations appear to be taking information management quite seriously, and some even have information managers in post. It is in this environment that the need for such a management function has been first recognised, and is likely to spread. In the past, these firms were the big spenders on traditional technical information services, and they were quick to exploit the benefits of computer systems both to counter rising staff costs and to improve their access to information. They are keenly aware of the value of commercial information in maintaining their share of markets, and appreciate that such information is a vital complement to their own management information systems. They are investing heavily in office automation and are generally conscious that its use will facilitate connections between information systems that at present are quite separate.

Government departments, international agencies, and some other large non-industrial organisations are generally far behind their industrial counterparts in developing any recognition of IM. Such organisations do not manufacture products or sell services—they process information. This means a lot of paper, so they are almost invariably afflicted with chronic problems of records management. Their systems for information-handling are generally primitive, and their bureaucratic culture tends to make them inhospitable to information technology and to new systems generally. In effect, such organisations desperately need their own special kind of information management, but their technical information services are not a powerful enough influence in that direction, and there has been no other obvious focus for any change of thinking. There are signs, however, that the Cabinet Office is beginning to take an interest in the subject of IM, over and above the good work of the Information Technology Advisory Panel.

Medium-sized industrial firms present yet another different environment in which IM has to be cultivated. IM will gain recognition here only if it can be shown to improve the efficiency and financial health of the firm. The signs are that it can. These are the firms that need good management information systems to remain in business; that deplore unnecessary paperwork and record-keeping; that are keen to integrate their information systems; that have suffered the calamities of early computer systems and now want to use IT properly. Some of them have good technical and commercial information services, that can help to introduce good IM techniques. Some have far-sighted managers who realise that good IM requires that someone with sufficient clout should be made responsible for these matters. No clear pattern is yet emerging of how these firms will adopt the concept of IM, and it is hoped that Aslib can play a particularly useful role here.

It is harder to see how information management will affect small firms. Their proprietors tend to be more preoccupied with survival than with niceties of management technique, and their information systems are usually basic. Those that learn to use IT effectively will reap the benefits of integrating their information-handling procedures. The more competitive will have to learn to make efficient use of publicly available information resources, and to regard this as an essential part of good entrepreneurship.

The above commentary refers to organisations by size. Other differences in patterns of information use and hence needs for information management can be distinguished between industrial manufacturing firms and commercial organisations—for example, banks, insurance companies, stockbrokers. All have some problems and requirements in common, but the mixture of skills required to give them all good IM will vary considerably from one to another.

Information who?

The future development of the information management profession will be determined by the people who will be in it. This will probably be a varied and changing population over the coming years. Some of them will be present-day information scientists and librarians, several of whom have already been converted into prototype information managers by taking on responsibility for an increasing range of information-related tasks. The pioneers took over functions such as central filing registries, laboratory report production, or office and reprographic services as a whole. The most advanced examples now control large departments including computer services, and in a few cases have a specific responsibility for information systems throughout the organisation. It is claimed, with justification, that those who come to information management through the special library/information science route bring to it a wider range of relevant skills than those who come to it through other routes, such as the data-processing function.

The demand for good information managers will probably exceed the supply available from the information science/librarianship ranks in the next few years, and although many firms may come to recognise the need to make someone responsible for their information systems, they will not feel justified in creating new posts. In these cases, the mantle of responsibility for information management will fall on whoever is willing and apparently able within the middle to senior management echelons. This may be a data-processing manager, a management services specialist, a marketing manager, or a company secretary, to name but a few. Such people will clearly need intensive training in the skills needed to discharge their new responsibilities.

In the longer term, the role of the information manager will, I believe, be mainly filled by people specifically trained for that job. The syllabus for their degree and postgraduate training will be substantially different from that which now applies to information scientists.

While it is essential that some people should be trained specifically for the information manager role, it is also important that at least the basic principles of information management should be included in the training of all managers. In the same way that they learn something of the principles of accountancy without becoming specialists in that subject, so should they learn the fundamentals of this new discipline. The need for this can be seen if we return for a moment to consideration of how IM will work in different sizes of organisation. It can be safely assumed that in large and some medium-sized organisation there will be a place for full-time information managers. In other medium-sized firms, the role will tend to be shared between two or more managers with other responsibilities. In small firms, IM will often be just one more concern for the proprietor.

Techniques for an information manager

Let us now return to the vexed question of how to define information management. One good way to define it is to say that information management is what information managers do. I have given some hints in the previous sections of what these paragons may have to know about. Certainly they require a mixture of knowledge and skills that are at present dispersed among several professions, and on top of that they will also need to acquire certain skills that are as yet not established. Their main areas of competence will relate to:

People;
Information;
Systems.

The *people* part will need to include basic management techniques, patterns of *information* use, and a smattering of ergonomics.

The *information* part will incorporate many of the elements of the present-day information science curriculum, but probably with different emphases. Topics will include:

information transfer—with special reference to such matters as document design (in both paper and electronic media);
information storage—including what is at present recognised as records management, and the concept of corporate memory;
information retrieval—including methods of classification and indexing;
information resources;
communications;
reprography, including micrographics.

The *systems* part will include:

information technology—its capabilities and applications;
computer systems;
office automation;
telecommunications;
systems security;
research methods, diagnostic techniques.

Where do we go from here?

In the United States, as my colleague Blaise Cronin has pointed out,[1] the concept of information management came of age in the mid-1970s, as a by-product of the activities of the Commission on Federal Paperwork, which concluded that new approaches were needed for controlling and managing data and information generated by federal government. Now there are two major professional associations representing the interests of information managers (AIM and AFFIRM), and information management is a recognised career path. Here in the UK, we have a long way to go, but Aslib has expressed its conviction in the future importance of IM by its change of name, and now provides an established base for promoting awareness of the concept, and getting it accepted within our organisational culture.

Four main areas for action are seen as having high priority, if IM is to gain the status it deserves.

(1) We need to pool existing knowledge and experience, from several professional areas, drawing together the many strands that make up this subject. This body of knowledge has to be consolidated and made available to all the professional groups mentioned in this paper through publications, meetings, and conferences.

(2) We need to plan and undertake research to fill the gaps in our knowledge and techniques.

(3) We need to provide training to upgrade present library/information professionals and others who will have to act as the information managers

of the next five to ten years. We must also contribute to the training of the specialist information managers of the future.

(4) We need to spread an appreciation of the concept as widely as possible, encouraging the view that information management is the proper 'umbrella' concept for the future development, implementation and control of information systems of all kinds.

An investment of resources was obviously needed to give the necessary initial thrust to this programme. Aslib has made such an investment, by setting up its Information Management Projects Unit. This unit is now embarking on a programme of work that will contribute in all the areas listed above, leading in the near future to new publications, training courses, meetings and conferences, and new research. Information management may not be a household word today, but we are doing our best to make it one tomorrow.

REFERENCE

1. CRONIN, B. What is Information Management? *Aslib Information*, **12** (2), February 1984, 27.

Aspects of referral

John Martyn and
Glenda Rousseau
Aslib Research & Consultancy

British Library Research & Development Report 5808

Introduction

THE REPORT of the Metals Information Review Committee[1] contains two recommendations relating to referral. The first, classed as a Principal Recommendation, was to the effect that a pilot referral centre for metals information should be established at the Metals Society and funded by the Department of Industry. The second, listed among the Other Recommendations, was that the British Library Research & Development Department should investigate the effectiveness of current informal referral practices, including the role of referral in technology transfer. It noted that the project should include consideration of whether there should be a national referral system for science and technology, or whether smaller, subject or industry-oriented services are more appropriate. According to the report, this recommendation was based on the finding that 'the referral function is a basic component in effective access to and availability of information, independent of improving bibliographic control and information dissemination. It provides a key to maximising the usefulness of existing resources of knowledge and information'.

Shortly after the publication of the report, an ad hoc meeting on referral was held by the British Library, at which it was agreed that some study of referral processes should be undertaken, directed towards examining the factors tending to bring about the successes and failures of referral services. This, it was felt, should be done by making a preliminary assessment of the relative volume of referral activity in query-answering activities, reasons for referring queries as opposed to other response options, and the factors influencing choice of source; assessing the means by which users identify potential external sources of information; assessing the viability of distinct referral services, as opposed to those operated as a part of conventional library and information services; and assessing the conditions necessary if support is to be sought for the introduction or enhancement of a referral service, whether as a separate entity or as part of an existing reference or information service.

Methodology

It was decided that the most effective method of carrying out this study, given its exploratory nature, would involve interviews with persons concerned

Aslib Proceedings, **36** (6), June 1984, pp. 253–267. Printed in Great Britain.

with, or responsible for, substantial referral activities. The first step was therefore to identify places which had a significant referral activity, either separately or as part of day-to-day information operations. This was done by discussion with active information officers within Aslib, the object being the identification of major, representative referral activities, as a sample for interview; no attempt was made to produce a comprehensive list of referral services. In the event, with some difficulty, twenty services were identified, none of which was solely or even largely a referral service. It proved impossible to locate a service which offered referral alone. A list of the services selected is given at Appendix A. At each of the selected locations, semi-structured interviews were carried out, a total of twenty-nine individuals being interviewed. The interview framework is given at Appendix B.

It had been hoped that during the interviews, some users could be identified who could be approached at a later stage, for information about their degree of satisfaction with the referral(s) they had been given and the consequences of their referral action. As it turned out, the investigators were unable to assemble a sample of users, because most information services are not able, without considerable effort, to produce lists of persons whose needs have been met by referral rather than by delivery of substantive information. However, most if not all of the organisations at which interviews were carried out are themselves 'users' in the sense that frequent use is made of other, external information services, so that the lack of a user sample was not a serious handicap.

The interviews were in most cases conducted by a pair of investigators, one of whom was responsible for recording the discussion. The general form of the interview was that of an extended conversation, covering the topics listed in the framework in Appendix B, but taking in and following up other topics, relevant to the referral theme, as they arose in the course of each interview. The interviews were typically of an hour and a half to two hours duration.

Findings

Because of the qualitative nature of the information acquired in the course of this brief study, the findings are presented in the form of a discursive essay. As a preliminary, some definitions of terms used are necessary.

Referral, according to the *Handbook of Special Librarianship and Information Work*, is the act of connecting a searcher for specialised information with an appropriate personal or organisational source. The *Handbook* implies that the term only applies to the interpersonal contacts, but in practice referral is usually taken to include also the referring of an enquirer to a specialist collection of documents such as a specialist library.

The person or organisation to whom an enquirer is referred is called a *source*. Sources can, of course, also be libraries or information centres, the governing principles in selection of a source being firstly an apparent high probability of being able to furnish an appropriate response to a particular enquiry, and secondly a reasonable certainty of willingness to give the response.

As Finer[2] points out, there are several definitions of *referral centre.* Some of the definitions expressly exclude conventional information work, in the sense of answering enquiries by physical reference to the literature, from the activities of a referral centre, restricting its work to the registration of sources of specialised information and the transfer of enquiries from individuals to the sources. In this narrow sense, there are very few referral centres anywhere, and probably none in the United Kingdom, because even those query-answering organisations with very little literature support, such as for example Citizens' Advice Bureaux, give some advice and information as well as providing referrals.

On the other hand, virtually every library or information centre gives referrals to specialised sources of information, as well as or instead of providing documents and substantive information, when such a response seems appropriate. We lack a concise term for 'the place that refers an enquirer to a source', and must settle for *referring library* or *referring institution,* preferring to avoid the use of 'referrer'. A place that from time to time is a referring institution may also, of course, on occasion be a source, the terms being associated with events rather than with states of being. For a discussion of the Referral Centre concept, the reader is referred to Finer[2].

The most immediately evident finding of the study, so evident that it must virtually be a truism to every practising information officer, was that referral cannot from most points of view be considered as a separate activity. When a library or information department answers an enquiry, the answer may be made up of locally-held information, documents containing relevant information, references to other documents, and suggestions of other persons or institutions likely to be able to help. Most answers are made up of more than one of these elements, and in the course of the present study, the extent to which referral formed a part of the response to an enquirer was quoted in proportions varying from 5 per cent to 75 per cent, with an average around 25 per cent. (This does not mean that 25 per cent of each enquiry is answered by referral, but that 25 per cent of all enquiries are in part so answered.) No separate allocation of resources is made for referral activities, either in terms of staff or stock, and every librarian and information officer will use referral where appropriate in answering enquiries. No self-respecting librarian (and 'librarian' subsumes 'information officer') is willing to admit that he or she cannot provide at least some information in response to a genuine enquiry, nor to withhold potentially relevant information if the library has it, so that although the librarian's first response to an enquiry will usually be to search printed sources, referral will be used if printed sources fail, or if the referral source is likely to complement or supplement a document-based answer.

Referral alone would usually be regarded as a last resort by a librarian, except in particular cases where it is clearly the most appropriate response to an enquiry. Referral is obviously the most appropriate way of dealing with requests for the most up-to-date information on the state of progress of a project, particularly when the information sought is unlikely to be found in a printed source: 'How far have they got with the M25 motorway?' or 'What are the proposed developments of that site in the High Street?' are examples of the sort of questions that might be put to an information department, and which would be referred to an appropriate Local Government Officer. Similarly, questions seeking know-how or experience may be more effectively answered by referral than by documents, depending on the context of the enquiry. However, it is generally the case that referral is a component of an answer, and rarely the whole. Librarians' views of referral vary to some extent, but most would agree that where an enquiry is for something more than a simple fact, or requires more than a very brief answer, the answer will very often include an element of referral. Without the ability to refer enquiries elsewhere, many libraries would have to turn some enquirers away.

The user, of course, characteristically presents himself or herself as a seeker after information, not as one requesting referral, and is in most cases likely to be indifferent as to the means by which the information is located. The enquirer generally wishes to expend a minimum amount of effort in acquiring this information, so would not be strongly motivated to put enquiries to a centre from which he or she could only expect to be referred to other sources, particularly when the United Kingdom has an information infrastructure providing a variety of other centres (including public libraries) from which substantive information might be expected. This implies, incidentally, that the major users of a national referral centre might be expected to be other information centres, except in some specific areas of information where the user may know that there is no substantive information available from conventional services.

Directories of various kinds are the standard tools for identifying likely sources of information, to whom enquiries may be referred. Persons interviewed during the present study mentioned a number of directories, those most frequently named being:

Kompass Register, and other similar trade directories;
Directory of associations;
Technical services to industry;
Aslib directory of information sources in the United Kingdom;
SRL guide to government department and other libraries;
Research in British universities, polytechnics and colleges;
Membership lists of research associations.

While these and other directories are regarded as essential adjuncts to referral activity, their deficiencies in respect of currency, indexing and information content are remarked by most librarians.

Directories to special collections are of their nature less likely to suffer from lack of currency, because such collections tend to stay in the same place, and retain the same subject interest, for relatively long periods of time. Telephone numbers, opening hours and other details may vary, but in general the main part of the record does not change over a short period of time. Directories listing individuals, research projects, or government departments or activities, tend to change much more rapidly, and are often unacceptably out-of-date. This is not surprising, given the inherent delays between collection of the necessary input, and its final publication, after checking, editing, setting-up, proofing, and so on. However, given that such directories can exhibit 25 per cent change over a year, and are possibly at least 10 per cent wrong (by virtue of outdatedness) on publication, their value is clearly sub-optimal. Online availability and updating of directory information would obviously improve its utility in this respect, although the problem of motivating the input providers sufficiently to secure their revisions, immediately a change in their input information took place, would still remain.

The indexing of directories is seldom at the same level of specificity as, for example, published secondary services, and there are wide variations between directories, with registers of research perhaps being indexed at a more specific level than most other sorts of directory. Usually, when an organisation is listed in a directory, only its broad field of interest is shown (eg 'pharmaceuticals', 'bio-engineering') which means that its relevance to any particular enquiry must be checked beforehand, by a phone call or other contact.

Published directories do not always give adequate details as to who can make use of or access the listed organisations or persons, and even less frequently do they give details of the type or quality of response available from each. In principle most directories are compiled as lists of persons or organisations who might be able to give information on some topic or other; they are not compiled as lists of persons or organisations who have declared their willingness to give such information. In other words, they are not necessarily offering any sort of information service, so that the response to be expected can only be known by practical experience. It may be that some organisations are not at all willing to give information on their subject of interest, and this too can often only be found out by experience. (It is worth noting, on this point, that in some directories, such as the *Infoterra directory of sources*, organisations are only listed if they have agreed to provide information to enquirers. This should guarantee a response, but in practice, the agreement to provide information may have been given by one person within the organisation, and when an enquiry is received, either it goes to another person who has not been informed of the organisation's willingness to respond, or the person who originally agreed to answer enquiries has left, and the policy left with them.)

Most librarians have their own network of personal contacts, which is their principal tool in identifying potential sources of information. Their informal lists of sources include other librarians, many of whom will be former colleagues, and institutions and organisations (and persons within them) whom they have used as sources of information before. Perhaps more important in many cases is the directory of one's own organisation. Libraries and information departments in large organisations, particularly in government or the public sector, tend to attract a substantial number of enquiries arising from inadequate briefing of switchboard operators, and so have an immediate need to know who is responsible for what in the organisation. This low-level switching is often not classifiable as referral, but it is true that in a large organisation, particularly one dealing with enquiries originating in part from the public or at any rate from outside the organisation, much of the referral activity is to sources within the same organisation. In public bodies there are often staff directories which can serve as the basis for an internal referral system, particularly when annotated by individual information officers. Contacts lists tend to be personal lists maintained by individual information officers. The personal nature of such contacts may sometimes cause these lists to be jealously guarded. As was pointed out by one interviewee, personal contacts are generally useful only at the local level; for distant, or foreign, expertise, one is obliged to rely on directory information, although two-stage referral can sometimes help to overcome this problem (ie personal contact with a subject expert, who provides another contact from among his or her own invisible college.) Membership of specialist committees is regarded as one useful method of acquiring good contacts.

Maintenance of formal 'indexes of expertise' does not appear to be very common, and in some cases, where such indexes have been maintained in the past, they have now been abandoned, for reasons of cost, and because of the difficulties of keeping them up-to-date. Even the informal lists of contacts may not actually be maintained in any organised way, and may be no more than an address book, with the indexing in effect carried in the head; some librarians, however, do keep card-index files of potential sources.

Virtually all the persons interviewed in the present study laid very great emphasis on the importance of personal experience of and personal contact with sources in giving referrals, in order to improve the precision of referral, and in ensuring the likelihood of a suitable response. Constant contact was emphasised, often to the extent of telephoning a potential source before making a referral, in order to confirm ability to give an answer, and, particularly in the case of industrial sources, willingness to respond. Of all the factors possibly affecting the success of referral operations, this high degree of personal knowledge of the sources is probably the most important, and it is difficult to see how its equivalent could be built into a formal referral system. The personal contact is essentially a compensation for the lack of currency and comparatively poor indexing of formal structures, with the addition of a little personal mediation to improve the chances of getting an answer. It also tends to work to the advantage of the sources, by reducing the number of inappropriate enquiries, and possibly by spreading the enquiry load to some degree. Sources, who as has been pointed out are not necessarily information providers in the sense of having information provision as part of their remit, are, when they respond to referred enquiries, acting voluntarily, and in most cases without reward. Like net lenders in voluntary interlending schemes, if the enquiry load becomes too onerous, then either the response to enquiries is abbreviated, or the willingness to deal with enquiries at all is withdrawn. Personal contacts can help to mitigate this problem.

It is worth noting that, even when an in-house source is being referred to, a quick pre-referral phone call can be useful, because in a number of operational situations, an individual's area of expertise can change very quickly, which can mean that although they are able to give some information relevant to an enquiry, it may be dated. For example, the consultant who carried out a study of European disability information services three years ago will probably know nearly everything there is to know about disability information services as they were, but may not be at all aware of the current scene if in the meantime that person has been employed in studying a different subject.

It is fair to say that the information sources in a personal contacts list may not necessarily be the best available sources; they are merely the best known to the librarian who has compiled the list. As such, they will have performed satisfactorily, to the best of the librarian's knowledge, in the past, and may be the most conveniently located or most easily contacted of the possible sources, but just as a published directory is likely to be somewhat less than comprehensive, so a personal contacts list is even more selective and less complete. Of course, very often an adequate source is just as good as the best possible source, if it is able to produce the right answer, or enough of the right answer to meet the end-user's problem requirements.

There is reason to suppose that this last point is often neglected, to the extent that high-quality information sources may risk being overloaded unnecessarily. Directories of sources of information tend to list the best sources, and sources so listed consequently tend to attract any queries on their subjects of expertise which cannot be answered by local library resources. It may often be the case that a referred enquiry could equally well be answered by a less exalted source, because the enquiry may not demand the highest level of expertise, or the particular enquirer may not be able to make fullest use of the most expert answer. A competent librarian will generally be able to assess the level of response required, and will usually answer an enquiry accordingly, but it is clear that if a formal referral system were to be implemented, it would have to incorporate some capability for the provision of a graded response, rather than simply identifying the relevant national Centre of Excellence when invoked.

The value or effectiveness of referral is virtually entirely dependent on the performance of a referral source when it receives an enquiry. In comparison with other methods of information supply, referral has some obvious deficiencies, in that it is inherently slower than, for example, online search, and demands more effort from the user because the enquiry must be resubmitted to the referral source. It is also likely to be less precise than other methods of information acquisition, because of the indexing problems mentioned earlier. The effort of making contact with the source may put off some users, and it is impossible to say how many referrals actually result in contact with the sources being made. Similarly nothing is known of the success-rate of referral, so that a comparison of the effectiveness of referral with other means of getting information is not practicable. However, as noted before, referral is usually complementary to, not competitive with, other information activities.

In the majority of cases, referrals are not followed up by the referring library. An enquirer is referred to a source or sources, and no systematic attempt is made either to find out if the sources were contacted by the enquirer, or, if contacted, what the result of the enquiry was. In most cases, such follow-up would not be practicable, because there is no way in which users can be obliged to report back to the referring library, or sources be requested to report action on referred enquiries to the referring library.

Librarians and information officers might be willing to provide feedback information, seeing it as being in their own interest or a part of their professional responsibility, but so far as general users are concerned, given the lack of motivation, the collection of feedback on any other than a chance or casual basis is effectively impossible. Users are sometimes told to return to the referring library if a referral does not produce the required information, but most users would prefer to abandon the enquiry or try elsewhere, so that this process is of little value in assessing the usefulness of sources. The extent to which users return with different queries cannot be used as any sort of measure of perceived value of referral services, because virtually no information service gives referral responses alone; repeat usage is an indicator of the perceived benefit of the information service as a whole.

Some guidance as to the quality of sources, apart from feedback from referred users, is obtained directly by the referring libraries in using various sources for their own information purposes. Usually, a referring library would prefer a user to contact a source himself, in the interests of clearer understanding of the user's problem, but occasionally, if all that is required is a simple fact or if it is believed that a better response is likely to be obtained by an institutional approach, then a library will put an enquiry to a source on a user's behalf. If the referring library is part of a larger organisation it will contact outside bodies on its users' behalf fairly frequently, with enquiries for information and requests for help in obtaining documents. It will also be contacted itself as a source by other organisations, and will thereby acquire potentially useful information about the interests of other bodies. It is therefore possible for a librarian to gain an adequate degree of knowledge of sources' potential without feedback from users, but the degree of knowledge of sources' performance is necessarily related to the degree of referral activity, both outgoing and incoming, the more active department building up a greater degree of expertise.

One particular group of potential sources (government sources) was almost universally identified by those interviewed as being poor in performance. Typical comments were, 'Government departments are notorious for not helping', 'Many government departments are blatantly unhelpful', 'Very little response from the Department of the Environment', 'Government information is a real problem, from DTI especially', 'No help at all from Home Office or DHSS'. In defence of government departments, their libraries and information activities are in general established to serve the information needs of their own staff, and not funded at a level to allow extensive service of enquiries from other organisations or the general public (although they themselves make considerable use of referral). A substantial part of the difficulty in using government departments as information sources probably lies in the scarcity of guides to government information sources at a sufficiently detailed level, so that many enquiries go to the wrong person or department. Interviewees in government or quasi-government libraries reported heavy use of internal staff and departmental directories, which are not publicly available. Internal communications in government departments are not always very good, which further aggravates the difficulties experienced by the outsider in trying to use them as sources.

We may now look back to the original specification for the present study, and see to what extent the original objectives have been reached. If the first question had sought an estimate of the demand for referral services, the answer would have been zero, because so far as the enquirer is concerned, there is no demand. All an enquirer wants is an answer, and on balance the average enquirer would prefer to have the answer, or most of it, on the spot. The level of use of referral is under the control of the libraries and information departments to which a user turns, and is in part a function of the type of enquiry presented, and in part a function of the resources of the library. As has been indicated, some questions can best, or even only be answered by referral, those questions seeking the most up-to-date answer, or personal experience of some kind, or, perhaps rarely at the national level, contact with a colleague-substitute, with whom experience and information can be exchanged and a discussion initiated. There is no particular reason to suppose that the volume of enquiries of those kinds which require a referral response is related to or associated with any specific user group; finance and banking is an area in which very up-to-date information is required, but services to meet that demand exist, and there is no associated need for referral.

Available library resources are probably a stronger factor in determining levels of referral. Economic constraints have obliged libraries to cut back on stock and to some extent on staff, so enquirers are increasingly likely to be referred to another library which has retained an appropriate level of stock or a particular expertise. To give a simple example, a person whose local library has given up the acquisition of Extel cards would probably be referred to the nearest library known still to be taking them. Economic pressures were mentioned by a majority of the interviewees as a reason for referring enquiries.

The relative volume of referral, that is to say the proportion of answers to enquiries containing an element of referral, is generally of the order of 25 per cent, with all but a couple of interviewees reporting that the proportion was between 10 per cent and 40 per cent. The type of library or the type of user served does not appear to have an influence on the proportion of referrals given.

The chief reason for giving a referral is to supplement the other information given in answering a question, or because the required information is not available from the existing library resources. Where an enquiry can be answered using the available literature resources, it almost invariably would be, because to some extent librarians see referral as a last resort, or something like an admission of inadequacy. Referral would be preferred to an online search (except in an industrial or academic environment) if such were appropriate, for reasons of cost—if, that is, the referral itself would be likely to provide an answer. There is no reason to suppose that referral is used as a work-shedding mechanism.

There are basically four factors affecting the choice of a source. These are: subject specificity or appropriateness; likelihood of willingness to answer; suitability; and location. Subject specificity is obvious; an enquiry about the progress of a planning application is appropriately referred to the Borough

Planning Officer, and one about equipment for a disabled person to the Disabled Living Foundation. Subject specificity could also be described as probability of having the right answer. Willingness to answer is often determined by a pre-referral phone call, but very frequently has to be assumed, as no indication of this is given in the majority of directories. Suitability is a criterion which would usually be subjectively assessed by the referring librarian, and amounts to matching the enquirer's level to the source, so that, to take an unlikely example, a layman's theological query is referred to the local vicar rather than to the Archbishop of Canterbury. Location, or referring an enquiry to the nearest source, if a choice is available, is not very important, falling well behind other criteria for source choice, but is obviously taken into account by the librarian responding to an enquiry, and related to the degree of urgency of the enquiry; if contact with a source can be made by telephone or post, location becomes unimportant.

How users identify potential external sources of information was described by one interviewee as 'a total mystery'. So far as may be judged, enquirers either start at their local public library, or onsite information facility, or use a combination of ingenuity, guesswork and memory, looking through the Yellow Pages, or thinking of likely sources. For this reason, the City Business Library receives enquiries from all over the United Kingdom from persons who have heard its name (including a number of librarians), but who do not realise that for their own particular enquiries there are equally suitable sources much closer to them. City Business Library is unfortunate in this respect; its name is accurate in that it is physically in the City of London, is a business collection and is a library, but it is in fact a Public Library and not, as its name suggests, a specialist library specially maintained by the City of London to serve its own financial interest.

In attempting to assess the viability of distinct referral services, as opposed to those operated as part of conventional library and information services, it is better to replace 'viability' with some equivalent of the concept of 'worthwhileness', loosely defined. Viability has an implication of economic self-sufficiency which is completely irrelevant in the present context. Referral, like any other answer to an enquiry, is generally given free, or at least at no charge to the enquirer, which would tend to make it hard to levy a charge for referral. More importantly, the user has so little affection for referral as compared to other forms of response that it is very probable that the only clients of a pure referral service would be librarians and information officers; given their own expertise, the use of a referral service requiring payment would be regarded as very much of a last resort, so that its volume of traffic would be minimal. Paying its way in these circumstances would be extremely unlikely, and therefore a pure referral service would have to be effectively free of charge to its uses, or nearly free, requiring heavy subsidy.

Taking the 'worthwhile' criterion, it might be marginally useful to set up a referral-only service in some area where demand was known to be high, such as the area of government information, for the use of librarians and information officers. The sources would have to change very frequently, because otherwise, after making use of the service a number of times, the clientele would not need to make further accesses, knowing the sources of greatest interest to them; use of the service would therefore tend to diminish over time, reducing its utility. Setting up a service for use by the general public would, as suggested in the last paragraph, not be worthwhile, because it would not attract sufficient use. An all-subjects referral-only centre would be too expensive to be justifiable, in terms of its likely use. Given the intimate relationship between referral and other modes of query-answering, and the way in which other forms of information work and referral tend to support each other, it does not seem reasonable to recommend setting up referral services distinct from conventional library and information service. A subject specialist is expert in both his specialist literature and his specialist information sources, and the interviewees could see no point in separating the functions.

Although a number of different views were expressed with regard to the desirability of a national referral centre as part of an existing central reference or information service, it was unanimously agreed that some action was necessary to coordinate and improve the available tools and mechanisms for referral. As regards a central referral service, about two-thirds were clearly in favour, and one-third against. Those in favour tend to be motivated by a feeling that the establishment of a central responsibility would encourage the development and maintenance of improved tools such as directories, and would provide a service of last resort, while those against the concept stress the need for improvement and coordination of facilities but do not think that a central service is necessarily the answer. To some extent it seems to be felt that the task of providing comprehensive guidance to all available sources of expertise and specialised knowledge is too great for one central body, and that much of the work of providing the necessary tools should be decentralised. A part of the argument against a central resource is that a detailed awareness of local resources can only be acquired at the local level.

At present, the various directories, registers of research, and other documents which comprise the published tools of referral are produced by a variety of bodies, private, public and governmental, which have for one reason or another taken it upon themselves to collect and publish the information. A profit motive, while not necessarily paramount, is often present. A good example would be the *Aslib directory of information sources in the United Kingdom* (a guide to sources of documents rather than to individuals or expertise), which was produced originally as a public service, but which would not have been reissued and regularly updated if the revenue produced by its sale did not indicate a healthy demand. Finer's study of directories[3] shows that of the directories she listed, library and information groupings and subject specialist organisations produced 83 per cent, commercial publishers 14 per cent, and national and local government 2 per cent. (Finer's study lists guides to bibliographic or other material sources in the main, and in principle excludes lists or indexes of individuals and/or research.) That is to say that no organisation is charged with the specific responsibility of producing any particular guide to sources, as such, so that where gaps in the provision of referral tools exist, their filling is a matter for voluntarily-accepted effort.

This is unfortunate, because the compilation and maintenance of a directory of sources is a relatively costly business, in view of the requirements for adequate updating; providing updated information is not something that sources generally do with great alacrity, and a high degree of reminder activity is usually required to secure the necessary input. The identification of possible sources for inclusion in a directory also often entails the circulation of a large number of questionnaires for a fairly small return of information. Questionnaires are generally used for the collection of directory input, because very often there is no other convenient way, and because when the intent is to create a list of publicly-available or at least not totally private resources, the act of questionnaire completion and return can be used to signify assent to inclusion in the listing, which amounts to willingness to perform as a source.

If some central resource were to be given the responsibility of providing a referral service, it would, broadly speaking, have three possible modes of operation. It could collect the required information, keep it itself, and respond to enquiries submitted to it from librarians or the general public. It could collect the required information, maintain it, and publish it from time to time as normal directory material, thereby providing the tools for local referral services to operate more effectively. Or it could collect and maintain the information, and make it available as an online database, for local access. There are other possibilities, involving a central coordinating point and local network nodes, with different responsibilities for collection and dissemination of information, but whatever the system configuration, the required information could only be made accessible in the ways suggested.

A number of the interviewees indicated a need for online directories. All those mentioning online service said that they would like to see an online directory of government sources; of the rest, virtually all stressed a need for better guidance to government sources in one way or another. 'Government sources' can bear two meanings, both of which apply: in one sense the term means 'sources of government information', sources from which information about or generated by government can be obtained, and in the other sense, it means 'sources of information in government establishments and departments', ie sources of specialised information who happen to work for the government. A directory of government sources would include guidance to the agencies supported by or dependent on government, such as the Research Councils, aid agencies, laboratories etc. Online versions of the *Civil Service yearbook, Technical services to industry* and the Science Reference Library guide were also mentioned. In parallel to this, some respondents suggest an online directory of local government sources, which may be presumed to be subject to the same interpretations as 'government sources'.

Prestel was also mentioned by a number of interviewees as a possible medium for directories of sources of information. A substantial amount of the present information content of Prestel, particularly that part of it covering community information, is referral-type material. Presumably if extensive source information, including guidance to government sources, were put up, it would then be available to the general public (unless a closed user group structure were used), in which case there might be an unwelcome increase in demands made on the listed sources, caused by unmediated public access, with a subsequent withdrawal of organisations which found themselves unacceptably heavily used by enquirers.

The economics of creating and maintaining an online or Prestel database of referral sources, sufficiently large to meet all the expressed needs, would almost certainly prove unacceptable, because it is unlikely that its frequency of paid use would be sufficiently great to cover or even approach its costs; referral information is much less attractive commercially than bibliographic or substantive information, and a referral base would also be competing with the multitude of local referral resources available to librarians and information officers. This does not mean, however, that the collection of some information on sources, and a determined effort to acquire as complete a range of directories and other referral tools as possible would not fill a real need, and attract sufficient use to justify the effort. If all or most libraries were making use of Prestel mailbox facilities, there would be a case for establishing a 'bulletin board' facility, such that if a central library were collecting source information and received an enquiry for which it was unable to find an appropriate source, a general request for help could be put into the 'bulletin board', for answer by any other library able to assist. In this way, the central list of sources would be added to in accord with the demands for information which were received from the users, in much the same way as at one time the stock of Boston Spa was added to by buying any requested journal not already in stock.

It may be noted that for purely local needs, private Viewdata systems, if available, could carry a variety of referral information which could be tailored to reflect local users' needs. Such services, together with some account of all local referral resources, should be made available to the central point, if a national facility were to be implemented. However, several interviewees pointed out that personal lists of sources such as were mentioned above are essentially private and confidential, being built up on a basis of personal commitments, and so cannot be incorporated in national structures.

On the basis of the information collected during the interviews, the only broad recommendation that can be formulated is that there should be some effort to assign a responsibility for providing and maintaining some basic referral tools, principally lists of government sources and of known Centres of Excellence, and that that responsibility should be given to a library or other organisation which has already a substantial commitment to conventional information collection and provision. Adequate resources should be made available to cover the necessary effort required in maintaining any source listings completely up-to-date, which includes ensuring as far as possible that listed sources are willing to provide information if requested, and any conditions of and restrictions on their information provision role. Resources should also be provided for collecting as comprehensive a range as possible of referral tools, both national and foreign. Online service would not be considered feasible, but willingness to act as a final port of call for referral information should be publicised to the library and information community.

REFERENCES

1. JONES, L., *and* VAUGHAM, J. *Scientific and technical information in the metals industry: report of the Metals Information Review Committee.* BLRDD report 5717. London: British Library, 1982.
2. FINER, RUTH. *Referral centres and services: a review.* Aslib Occasional Publication No. 22. London: Aslib, 1979.
3. FINER, RUTH. *Survey of current directories: an update.* BLRDD report 5615. London: 1979.

APPENDIX A

Organisations interviewed

Aslib: The Association for Information Management
Cement and Concrete Association
City Business Library
Claim
Department of Trade and Industry
Glasgow Referral & Information Network
Greater London Council
Health & Safety Executive
Hertis
Institution of Electrical Engineers
Intermediate Technology Development Group
London Weekend Television
Machine Tool Industries Research Association
Manchester Commercial Library
Ministry of Agriculture, Fisheries & Food
National Physical Laboratory
Science Reference Library
Sheffield Libraries
Spastics Society
Water Research Centre

APPENDIX B

Interview framework

1. Organisation name.
2. Name/position of interviewee.
3. What is the status of referral in the organisation as a whole:
    - large percentage of workload?
    - separate activity?
    - part of general library activity?
4. Does referral take up a large percentage of *your* work?
5. What are the referral activities called (special name)?

6. How are calls/enquiries from the public routed for referral requests?
7. Are there are subject areas for which you tend to use referral?
8. Are there any subject areas for which you strive to be self-sufficient?
9. How are priorities set, for collection in-house as opposed to relying on referral (economics of referral)?
10. Type of clientele for referral (manner of approach: telephone, etc).
11. Extent to which clientele who have been referred elsewhere, come back.
12. What feedback, if any, do you receive from users of the referral service? or from the sources to which users are referred?
13. What form does referral take:
    - ad hoc suggestions of sources?
    - prepared leaflets/listings?
    - names and addresses and contact?

    organisation name only?
14. What sources are used for identifying information sources:
    - published directories?
    - experience/specialist knowledge?
    - in-house directories/expert index?
15. If in-house directory is kept:
    - how is it built up?
    - how is it updated?
    - how far is the quality of sources checked?
    - do you check willingness of named sources to cooperate?
16. Qualifications of staff (professional; academic; experience in industry, etc).
17. Is referral cost-effective, as a means of supporting the needs of public?
18. What are the major failings in the present system, to your mind?
19. Can you provide name(s) of regular clientele, for us to interview?

STATUS

The flexible information retrieval and information management system.

Many Special Libraries and Information Centres now rely on STATUS for on-line integrated information retrieval and information management. There are over 120 STATUS users worldwide with an active STATUS Users Group.

The STATUS Software System:

– Runs on 20 different mainframes/minis/micros

– Is being used for a wide range of different applications

– Has a comprehensive set of facilities

– Is easy to use by occasional users

– Provides on-line modification of databases

– Is easy to integrate with other software systems

For further information please contact: Derek Matkin, AERE Harwell. Oxfordshire OX11 0RA
Telephone (0235) 24141 extension 2704

The subject librarian and social scientists: liaison in a university setting

A. Holbrook

Social Sciences Librarian,
University of Bath

A review of the human and professional relationships between university social scientists and the subject librarian. Some general principles that concentrate on personal aspects of interaction are put forward for consideration. Problems and techniques in establishing initial contact with users are outlined followed by analysis of formal and informal liaison with the three main groups: undergraduates, postgraduates and staff, the latter in more detail. Attention is paid to wider influence on user/librarian contact. These include social scientists' perception of the library and subject librarian, the siting and organisational context of the subject librarian, and the long-term need for the liaison role.

Introduction

While the literature of librarianship rightly places emphasis on the future of the profession and technical advances, there is relatively little on users of services and less again on how we as professionals interact with them in terms of human relations. My experience of substantial liaison roles in polytechnics, further education and, since 1976, as assistant librarian/information officer responsible for the social sciences at Bath has given insight into the problems and methods involved in serving academics from a mainly social science background. Although one's views may be coloured by dealing with a narrow range of users in a specialised environment, I would hope that at least some of the conclusions drawn here would be of more general application and worthy of consideration whenever a librarian has a major liaison function.

The nomenclature of individuals in this situation is varied and confusing. In this paper, 'liaison librarian' or 'subject librarian' has been used as shorthand to describe anyone who might in practice be labelled 'subject specialist', 'readers adviser', 'subject reference librarian', 'social sciences librarian', and so on. An earlier paper on a similar topic stated that relations between librarian and reader were dependent on 'the fundamental facet of each party: on the one hand, the personality or attitude of the librarian and on the other, the motivation of the reader, which, in a university context, is crucial, whether at the student, research or reading level'.[1] That premise remains as true today and forms the underlying assumption of much of what follows.

Liaison in the library

This has been defined by a law librarian as 'Those occasions, formal and

Aslib Proceedings, **36** (6), June 1984, pp.269–275. Printed in Great Britain.

informal, when there is some exchange of information between librarian and library user and the services it provides'.[2] I want to concentrate on the normal point of first contact with the reader, that is, the subject floor or area of the library building. The cardinal rule is to be prepared for any type of question, from routine directional to complex investigative, while at the same time trying to determine the real level—whether 5 lines or 500 pages are adequate. This level will depend largely on the reader's status and motivation linked to the time available to complete the work. The librarian's response can then be adjusted to suit. It is pointless to begin demonstrating literature search techniques for someone wanting a short definition, but on the other hand an apparently trivial request may conceal a real need for information in depth. The subject librarian's art is like that of the reference librarian in often needing to elucidate the question rather than the answer. This will lead one to stock questions like 'How much time have you got?' or 'Is this for an essay/seminar/dissertation?'.

Many people are diffident about approaching a subject librarian, even one known by sight, whose function has been advertised as that of giving direct assistance. Frequently they will have spent considerable time on a fruitless search and therefore are more appreciative of a businesslike approach as against a recital of library procedures. The librarian must hope that such a response will generate further questions from those who see us as too busy or forbidding to disturb, or think their problem too trivial to raise. Just how many readers will not use a liaison librarian remains unknown and will vary with local circumstances but an Australian teacher-education college survey fitted into the 'general pattern that a large proportion of students hesitate to ask the reference librarian for help . . . The main reasons for this reluctance to ask for help are that 'they do not wish to disturb the seemingly busy librarian with their trivial questions or that they do not wish to appear to be ignorant in front of an intimidating librarian'[3]. It is to be hoped, however, that a subject librarian would be much more familiar with students' problems than an all-purpose reference librarian.

If every question is to be answered successfully, then it is not always wise to take responses at face value, particularly when the enquirer claims to have already searched catalogues and shelves. In many cases it is prudent to recheck these steps, if necessary on the pretext of a hidden complexity in the system unknown to the user. A significant proportion of reader failures in the social sciences, as elsewhere, is due to elementary errors of perception or transcription. Nevertheless one's overriding professional concern must be to visualise the image presented to the customer because anyone 'who truly professes must be struck again and again by the difficulty of persuading people that they are not bothering one, that they are not imposing, that they are not impertinent'.[4]

Groups of users

University social scientists are divisible into status groups, each of which vary in their interaction with the subject librarian.

Undergraduates and postgraduates

Undergraduates normally form the largest user group and most liaison will be channelled into finding specific items or subjects directly derived from lecturers' reading lists. The majority of undergraduates seem unwilling or unable to deviate from such prescribed reading, whether it be from diffidence, a desire to toe the line, or even plain confusion at the range of choice. A typical case is the student clutching a reading-list and baffled by the citation or location of references. Remedies are likely to be rapid—a few words of explanation or a double-check of catalogue and shelves. Some enquiries will concern the non-availability of referenced journals which are for library use only. Abuse of journal holding may unfortunately be a growing problem and solutions such as photocopying key articles or putting runs on closed access are expensive and less than satisfactory. A striking feature of student use is the wildly variable level of understanding of library procedures and what constitutes a reference. One individual may be practised in using abstracts while another may with difficulty grasp the nature of journals.

Reading-lists are likely to continue to dominate the ways in which undergraduates use social science libraries. They are therefore crucial to the liaison librarian—where liaison is seen in the positive sense of meeting demand—who must analyse them along with circulation data to remedy gaps or buy extra copies. Ultimately it is the number and quality of undergraduates which underpin the university. Completion of a dissertation is standard in many first degrees and so for probably the first time the student will need to make an independent literature search. It is at this stage of the course that increased individual confidence and incentive may well give more meaningful interaction with the subject librarian. Relevant secondary sources can be explained on a one-to-one basis to show those from disparate disciplines that a considerable literature exists after all on this topic. Handling such embryonic research at this level generates a responsibility to guide those whose bibliographic knowledge is weakest.

Postgraduates on taught courses use the collection in much the same manner except that they have to complete a longer dissertation. Generous free time during and after the taught component should ensure plenty of liaison and consistent use of services. Groups are generally small and this enhances personal relations. The full-time postgraduate researcher, whether for higher degree or research project, is probably the heaviest of all users. No two researchers will be alike in their approach to the literature, ranging from those who have a well-organised familiarity with primary and secondary sources to others who agonise before clarifying the precise topic. Many are unaware of *any* bibliographic aids and a correspondingly greater effort will be needed to meet their information needs. Although one expects researchers to be mature and confident this may not automatically lead to greater use of the liaison librarian. Questions may be viewed as too embarrassing to ask or there may be a feeling that nobody else knows more about the specialist area.

Staff

Turning to academic staff, it might be anticipated that social scientists are the keenest patrons of services with 'the library as their laboratory'. A few are, yet I agree with the view expressed by R. Adam that 'Social scientists are not, in fact, heavy users of library services, despite much of their work being literature based'.[5] Those at senior levels gather much information informally through personal contacts or the receipt of gift and review copies. The majority are affected by problems of bibliographic coverage in that their subject is not covered adequately by any abstracting or indexing service; the services are American, or impeded by production delays or poor organisation and so on. Another factor is the increased significance and specialisation of the lecturer's research, upon which career prospects are based. Remaining up to date even in a narrow field may be difficult, especially if not all material is conventionally published.

In the long run the teaching staff should have major influence on what type of collection evolves. How can liaison with them work?

Familiarity is the obvious prerequisite, the subject librarian being on Christian name terms with all faculty members, and expert on their research areas, reading lists, book ordering and associated parts of the collection. A great deal is public relations ('In any information service, the personality of the information officer is crucial'[6]) but academics value efficient service and response at least as much as intellectual conversation. The value of informal meetings over coffee or outside the library cannot be underestimated; neither should the worth of memos and circulars be overvalued. It is essential to visit the departmental building at least once a day, preferably around mid-day when most people are on campus. This will often prompt responses like 'I was meaning to see you. There's a problem about books for my new course' or 'I don't understand why our books have been moved again this vacation'. Many of these queries would never be raised without a visible presence and yet they are exactly those most crucial to the trouble-shooting ombudsman role of the liaison librarian.

Pioneering work in Britain was done at Bath from 1967 to 1971 when the findings of the INFROSS report (on information requirements in the social sciences) seemed 'to point strongly to the need for personal intermediaries'[7] in the social sciences supplying information from the library to academics. That university did create a modified scheme of information officers, known as school librarians, serving all its fourteen schools but with the addition of more traditional duties such as collection development and subject reference work. INFROSS services were maintained with the exception of SDI cards, and recent developments have seen online searches and the copying of journal contents pages on receipt for interested staff. INFROSS stressed the value of having a foot in both camps, and as an experiment I spent half a day a week in the school for a term. This was not really beneficial since staff would forget I was there and try to make contact in the normal way, and the office I used was not sited to attract the casual enquiry. Little extra 'liaison' developed and the scheme was not repeated. Perhaps placing a desk in a busy area would produce more questions, but of necessity a high proportion could only be answered later. As an aside it would be interesting to know which university or polytechnic libraries have staff employed solely in meeting the information needs of academics.

Liaison at the more formal level, as represented by the school/faculty/departmental board of studies, increases awareness of new degrees and options, changes in teaching methods and the direction of future research. The librarian will note school needs and be better placed to plan services and expenditure while simultaneously improving status. Attendance is useful at those staff-student and staff group meetings which have library matters on the agenda. A particular advantage of group meetings is the possibility of referring back to them individual requests for new journals so they can evolve as group rather than personal priorities. Membership of other committees may be offered to the subject librarian and this would doubtless aid integration. The benefits of involvement would need to be balanced against the time involved and the possibility of not being seen as neutral in academic affairs.

A lecturer's perception of the subject librarian will directly influence dialogue between the parties, and yet how often do we visualise our public image? Many factors are involved and little is written. I suggest the following are some of the more influential aspects:

our capacity to bypass procedures and do people favours;
speed of response;
availability;
performance in teaching library and literature use;
grasp of the collection;
manifest subject qualifications;
place in the library hierarchy.

The more mundane aspects presented probably have greater impact on others' perceptions than many of the formal features. Subject librarians are in their own way as highly specialised as any lecturer and just what the job entails intrigues many outside. Students will see the reader assistance role clearly, whereas with staff it may be necessary from time to time to show how one's activities can directly assist their teaching or research.

General factors affecting liaison

Social scientists' views on a library are likely to be most influenced by their experience of how personal needs are met. If the collection is seen as adequate or better, then relations are easier, attitudes more positive. Achieving a 'good' collection will be dependent on the librarian's experience and opportunity, both financial and organisational, to select freely and in partnership with academics. Not only must a balance be struck between book and periodical expenditure, new and retrospective acquisitions, single and multiple copies, and between subjects, but also account taken of course numbers, quality of existing stock, future of the subject in the department, and the age of the lecturer (in other words, will the research area continue after retirement?). The subject librarian's insight into the methods and popularity of lecturers will aid rational acquisitions and use of resources.

Physical factors are equally crucial to a favourable outcome. These include proximity of the department to the library; whether the department has a centralised office; siting of the librarian and distance from catalogues and stock. Assistance to readers from a prominent open-access position will be more readily seen and taken than anything available from an office. Clearly the liaising librarian's function must be advertised at the enquiry point and more generally in the building. Readers will be more inclined to ask if it is obvious that they should do so. That some social scientists may only infrequently use collections or subject librarians has already been mentioned, but the extent of this, and the effect, if any, on final performance, remain vague. A small-scale feasibility study of Aslib membership in 1980 on non-use of services in the industrial and commercial sector as perceived by librarians and information managers found that 'Eighty-seven per cent of our sample were aware that they had some kind of sub-optimal usage problem'.[8] Respondents reporting conversion of non-users put promotion, publicity and advertising (49 per cent) just ahead of contact, communication and socialisation (46 per cent), followed by examples and demonstrations of efficiency (41 per cent), then education and influencing the informal system (36 per cent).

Other areas which may repay further study are:

Comparisons of science and social science users (are they still so different or converging?)
The amount of time spent on liaison rather than directional work
Is there an optimum size of library for subject/liaison schemes?
Will the pressures of the 1990s increase or lessen the need for intermediaries?
Will there be significant changes in the teaching methods or literature searching patterns of staff?

The reader may ponder whether the experience and impressions depicted above are sufficiently typical to generalise about social scientists and libraries. Certainly the services and accommodation at Bath are quite similar to other of the newer British academic libraries with the exception, perhaps, of the seven school librarians each serving full time the needs of one or more schools and having no administrative responsibility.[9] Bath is at one end of the spectrum, a purely functional arrangement at the other. True, the linguist or scientist will behave differently in some ways, but all interact with libraries in which the size and complexity of stock, in addition to services and procedures, are steadily increasing. Staff in those libraries have to become more specialised and may be unaware of systems in other sections or the location of unusual items. The liaison librarian will be able to monitor all aspects of the service, whether it be acquisitions, cataloguing, circulation, inter-library loans or periodicals, to comprehend and hasten the progress of requests.

The literature of the social sciences is tremendously eclectic in its subject matter and range of sources, official, semi-published, working papers, etc. To trace and record this output, there is a mixed and incomplete range of secondary services unknown to many. It seems most unlikely in the foreseeable future that a more coherent system will develop for the researcher and for this reason alone the need will continue for extensive liaison to advertise and explain what is available. Subject librarians are expensive and the benefits they give are hard to quantify. Against this it is doubtful if universities will be allowed real growth in academic staffing levels, and the need to develop and exploit a collection may increasingly devolve onto the subject librarian, thereby compensating for greater teaching and research loads on lecturers. Certainly the institution itself would be impoverished in the long run if its population saw the central library as remote or uncaring, and lost involvement.

REFERENCES

1. HORTON, J. J. Library liaison with social scientists: relationships in a university context. *Aslib Proceedings*, **29** (4), April 1977, 146–157.
2. LOGAN, R. G. Liaison with law library users. *Law Librarian*, **7** (3), December 1976, 39–41.
3. KOSA, G. A. The psychological barrier between college students and the librarian. *Australian Academic and Research Libraries*, **13** (2), June 1982, 107–112.
4. HORN, R. Why they don't ask questions. *R.Q.*, 13, Spring 1974, 225–233.
5. ADAM, R. Putting the 'social' into social sciences information. *Behavioural and Social Sciences Librarian*, **3** (1), Fall 1983, 3–17.
6. EVANS, S. M., *and* LINE, M. B. A personalized service to academic researchers: the Experimental Information Service in the social sciences at the University of Bath. *Journal of Librarianship*, **5** (3), July 1973, 214–232.
7. LINE, M. B. The information uses and needs of social scientists: an overview of INFROSS. *Aslib Proceedings*, **23** (8), August 1971, 412–433.
8. SLATER, M. *The neglected resource: non-usage of library-information services in industry and commerce.* London: Aslib, 1981. p. 8.
9. For a more general account of the establishment, advantages and drawbacks of the school librarian scheme at Bath, see:
   HOLBROOK, A. School librarians at Bath University library: a social science case study. *Aslib Proceedings*, **33** (1), January 1981, 23–31.

Aslib Occasional Publication No 29

The transition years:

new initiatives in the education of professional information workers

Blaise Cronin

Will library schools as we know them still be with us in the 1990s? If not, what will have taken their place? How must the schools adapt to meet the challenge of the eighties?

This report based on a comparison of trends in Western Europe and North America, examines the prospects of library schools and assesses the factors that will contribute to the shaping of future information professionals; curriculum development and educational structures are considered in the light of the new and increasing demands that will be placed on the next generation of information workers.

210 × 150mm 60pp 1984

ISBN 0-85142-189-X
UK £8.50 (£7.00 to Aslib members); overseas £10.00 (£8.50 to Aslib members)

Alternative careers for library-information workers

Margaret Slater
Aslib Research & Consultancy

CERTAIN ASSUMPTIONS are implicit in producing a paper under the above title. Doing so would seem to indicate that alternative careers for library-information workers are necessary, possible, desired and desirable. The topic is also self-inflating or self-reinforcing. It suggests the existence of a continuing basic problem, instead of a matter of short-term expediency.

In actuality this paper will make none of these assumptions. Rather it would seek to question them. So it runs the risk of heavy criticism on grounds of both negative thinking and poverty of evidence to back up any kind of thinking, either dynamically proactive or pessimistically reactive. In this context it is also worth stressing that if the subject of alternative careers is worth any serious consideration, then writing a shakily founded 'position paper' of this kind is no substitute for proper, conscientious gathering of all available relevant data and its considered evaluation and interpretation. A state-of-the-art rampage of the type here undertaken could in fact be a dangerous enterprise, if confused with such thorough research. All that is now being attempted, therefore, is preliminary ground-clearing, an invocation and questioning of issues and priorities.

Taking and expanding the questionable areas raised at the start of this paper, let us consider first the natural preferences and motivation of the present workforce. To which other careers might library-information workers be attracted (and in some cases have proven aptitude by actual prior experience)? To what extent would they accept, or even welcome, an expansion of their professional horizons or outward bound mobility?

Such topics involve consideration of professional identification: how library-information workers see themselves and their occupation; what they think it is all about; how satisfied they are with their current profession. What other occupations do they relate to, see as alike, or in any way comparable? Evidence here is drawn from sources readily available, the detailed work of Sergean[1,2] and myself[3] in this area.

My own data for 1978 indicated that 53 per cent of the professional workforce might gladly embrace an alternative career, given the opportunity. This level is actually high in comparison with other professions. In the *Which* survey of 1977,[4] only 14 per cent of doctors would do so, 30 per cent of nurses, 31 per cent of secondary school teachers, 53 per cent of secretarial-clerical workers and 70 per cent of unskilled manual workers. Sergean identified a smaller dissatisfied minority of 36 per cent from data collected in 1974–5. His original question, however, was more closely tied to present

Aslib Proceedings, **36** (6), June 1984, pp. 277–286. Printed in Great Britain.

job, less to career choice. As the two surveys occurred at different points in time, it is also possible that the disaffected group grew during the 1970s, as the general economic and employment situation worsened. Both results, however, indicate a sizeable proportion of the workforce potentially more than willing to indulge in career-switching.

If they did so, in which directions would they wish to go? A straight answer for the profession as a whole may not be possible. Different segments within it may have different aims, identifications and aptitudes. What are the meaningful job 'market segments' in this context? Should one, for instance, begin by distinguishing between 'librarians' and 'information workers' (or scientists)? The answer would seem to be both yes and no, or partially, but be careful how you do it, or you may wander right out of the real world.

The boundaries between library and information work are fluid. The two concepts may represent a theoretical model rather than a map of actuality. In other words, one could represent library-information work as a continuum with opposite poles. In between the poles are various shadings and gradations, inextricably blended mixes of library and information functions.

Equine experts make the necessary nice distinctions by refusing to refer to white horses, except in the abstract. The white horse is a myth, a horse-breeder's dream, a platonic form, a theoretical possibility. Found mainly in the surf, in fairy tales or liquor advertisements, and ridden by exclusive beings like Epona, Godiva or Galahad, it is seldom incarnated in nature. The animals that you or I in our ignorance would unhesitatingly label 'white' are properly called 'greys' by the knowledgeable. Examination of such creatures would prove the rightness of such terminology. In all cases there will be some admixture of coloured hairs. Curiously enough, the same semantic purism does not seem to apply to black horses, which just goes to show that either (a) nobody is perfect (or perfectly consistent) or (b) black horses, unblemished by premature grey hairs, do occur naturally and with reasonable frequency.

Both Sergean and myself found it similarly difficult and unrealistic to draw strict definitory demarcations between library and information work. Information work may however be more like the black horse, and library work like the white, in that it is extraordinarily hard to imagine a library with no information content or function. An information service independent of conventional documents and 'books' is however much more conceivable. Sergean is close to this viewpoint when he says that both should be referred to as one entity, the information industry.

Sergean stressed that his research team 'found nothing in the course of this project to suggest the existence of two occupational areas "library work" and "information work", which are quite different in nature. Such barriers and boundaries as exist appear to be largely artificial'.

This stance represents valid input to the debate on professional definition, emanating from an objective expert witness. Sergean is an industrial psychologist, with considerable experience of examining and analysing a variety of occupations. He soon realised that terminological difficulty was not new in the library-information field. Others before him had wished for one title to describe what he firmly called 'a single service industry or activity dealing with a commodity (namely, information) of various kinds and various forms'.

All books, he pointed out, contain information, broadly defined. The apparently simple provision of books often involves substantial evaluation of user need and of documents supplied. The bookmobile assistant who recommends a historical romance to a reader, saying 'I think you'll enjoy this Mrs Thomas', Sergean believed to be 'evaluating information just as surely as the "information scientist" who produces an assessment of a complex report for a technical committee'. For these reasons, Sergean was among the first to use the terms 'information business' and 'information industry'. It is interesting that he used them primarily to describe the library-information field.

Although agreeing with Sergean in principle, and on the level of work content and job description, I concluded on the basis of work I carried out in 1978 that other real differences existed between librarians and information workers in general (and information scientists in particular). As people they seemed to differ. Personal and professional background and qualifications were not the same. Nor were personality, self-image, job-motivation, or original reason for entering the field.

Summing up these differences briefly, at that time the librarian was more likely to be a woman, the information worker to be a man. The librarian was also younger than the average information worker. The librarian was less likely to have a subject degree, but more likely to have a formal library-information qualification. Subject degrees possessed by librarians favoured the humanities and the social sciences, whereas those of information workers tended heavily towards science-technology. The librarian appeared to be people-directed, with a strong service motivation, seeing 'herself' as an 'educative, civilising, caring and helping influence on society in general and her users in particular'.

By contrast, the self-image of the information worker was that of a problem-solver and communicator, having much in common with a technical or investigative journalist. Relating fairly easily to other people, the information worker nevertheless expressed a stronger impulse than the librarian towards self-expression, personal fulfilment and achievement via career and specific post. Unlike the librarian, the information worker seemed to learn service motivation on the job. Service ethos was comparatively lacking as a reason for entering such work.

Differences of the kind described above seem bound to affect work-style. What the two divergently endowed groups bring to what may be seen as similar jobs, from an employer or user viewpoint, may therefore vary greatly. At the moment there would seem to be a need for both kinds of people in the profession. The analyst and the caring helper complement one another rather well. This situation, however, could change dramatically in the immediate future. Impingement of external factors, like innovations in information technology and the emergent information society and information industry, represent powerful influences already at work on our profession. Responsive educational shifts and changes in curriculum development, both inside and outside the library-information sphere, will also shape and remodel, unify or further divide librarians and information workers, or possibly attenuate and diffuse both the latter roles.

Current differences, however, between librarians and information workers, have some relevance to the directions in which personnel of various kinds might be prepared and able to diverge into other occupations. Actual experience of other types of work, for instance, might be a desirable characteristic from a prospective employer's point of view, indicating adaptability and versatility and so facilitating entry into other occupations.

Sergean found that 48 per cent of the sample used in the Sheffield Manpower Study had experience of 'outside work'. In my sample I also found that 47 per cent had worked in other occupations—such as teaching, communications work for the media or in public relations, scientific or technical work, or secretarial-clerical work. Different segments of the library-information workforce had relatively more or less of this 'outside experience', so might have varying degrees of difficulty in becoming outwardly mobile.

Work experience outside the field differed in some ways between librarians and information workers. Jobs in the communications field or as a scientist or engineer formed a typical background for an information worker. Librarians were more likely to have been involved previously in socially useful, caring, helping occupations and were more likely to have worked in non-graduate jobs—eg secretarial or clerical work. Teaching experience, however, was frequently found in the backgrounds of both librarians and information workers; and teaching combines elements of information synthesis and its communication with service orientation and nurturation, thus straddling the apparent library-information schism.

People engaged in information work in 1978 tended to have entered this field comparatively late in their career, after training for and working within some other occupation. Direct entry (first job) was a more common phenomenon in library work. Information work is, however, more recent in origin than librarianship as a distinct profession. Suitable jobs in this field may have been scarce when many of my respondents started looking for work. Information work as a discrete occupation probably had a low profile. It was not widely known and so did not occur to respondents as a potential career opening.

Analysis of differences by employer or organisational sector spotlighted public librarians as least likely to have experience of other occupations, information work, or fringe work on the borders of the profession.

In the context of outward-bound mobility, the disadvantaged groups would seem to be: women; public library staff; people whose job-title is librarian rather than information officer or scientist. All these categories had lower levels of work experience outside the library-information profession. Outside experience in the sample as a whole stood at 47 per cent: men = 62 per cent, women = 39 per cent; information workers = 66 per cent, librarians = 43 per cent; special sector staff = 61 per cent, educational sector = 44 per cent, public library sector = 30 per cent. To compound practical job-hunting difficulties arising from lack of experience and proven aptitude, the three groups concerned may well have more of an image problem than contenders from other sectors of the library-information field.

Over all, material so far collated indicates that a substantial proportion of the workforce might be willing to consider alternative careers, and that they would be competent to operate within them. Whether, with a recent library-information background, these people would be acceptable to employers for work in other capacities (and if so, in what specific capacities) and how well they would compete with candidates from different occupational backgrounds is another story. It involves not only motivation and the self-image, but also the public and particularly the organisational image of the traditional library and librarian.

Problems in achieving alternative careers would then seem to be located not so much internally in the workforce, as in the external environment. Let us therefore examine it. In which avenues or areas might there be openings for people of our kind, or indeed of any kind? Is it realistic to contemplate alternative careers in a wider setting of other professions with very similar problems? Doesn't this become a case (to quote the film *Saturday Night Fever*) of 'everybody just dumping on everybody else'? In particular we should note that most of the professions which our own seems drawn to, or identifies with, are themselves subject to the same economic pressures and cutbacks. For all we know, surplus teachers and social-workers are being urged to think seriously about an alternative career as a librarian, and redundant scientists asked whether they have ever considered taking up information work. Moral issues also arise. By solving our own problems (if we can), we only create problems for others. The need for liaison with other professions (once sensibly identified as relevant) and indeed for a national manpower information system and plan becomes increasingly apparent.

Are there any exceptions to the downward employment spiral, of which we could take advantage without disrupting anybody else? Do fields, occupations or industries exist in which there are actual shortages of skilled personnel? The very use of the word 'skilled' raises a further delicate issue (so far dodged) of retraining for alternative careers. Who would organise and pay for this? Would retraining be seen as the responsibility of 'the Government', the Manpower Services Commission, the formal educational system, the library-information profession(s), the individual employer, the individual worker, or nobody in particular?

One exception to current attritional trends that immediately comes to mind is the computer field and allied areas, information technology, office automation, new technology, robotics. In practice, growing numbers of our workforce have some experience in some of these areas, although it tends to be restricted, intensive rather than extensive.

Doubtless it also lacks what sociologists are prone to call a wider 'theoretical framework'. In other words, the norm is probably the librarian or information officer who learned about automated systems the hard way, for strictly limited and pragmatic purposes. Nevertheless, the fairly favourable position statement just made is probably a lot more than can be said for a lot of other professions. One is tempted to guess that the average doctor, dentist, nurse, pharmacist, teacher, social-worker, solicitor, etc. has limited experience even as an end user, and little or no experience of automated systems or service design and operation.

So we may be in a theoretically good position to enter the systems and software side of the information technology field. Can we however persuade employers that this is the case? How well can we compete here against our likely competitors? Ignoring the realities of expertise, at what disadvantage does our traditional 'bookish' image put us, in attempting to crash the paperless professions? Even if we can compete, will 'they' let us? The information worker would here have the edge over the librarian; if only by virtue of a predictively brilliant job-title, s/he sounds more deserving of a place in the sun in the 'information society'. Systems called 'information services' are also rather more likely to have experienced some degree of automation than systems called 'libraries'.

A Manpower Services Commission publication of late 1979,[5] although now outdated, casts some light on the general topic of continuing if selective need for skilled labour. It also indicates the type of source material to which anyone seriously investigating alternative careers should refer. It also airs another problem—information is more prevalent for the more numerous non-professional occupations and their practitioners.

Considering 'management, professional and clerical' occupations, it admits that 'information is not good' for higher occupational levels. Nevertheless some hard-to-fill vacancies did seem to exist in professional occupations, 'including most commonly draughtsmen and electronics engineers, as well as engineering technicians, systems analysts, computer programmers, O and M officers, accountants, mechanical engineers, estimators and valuers and production engineers'. Nursing vacancies also appeared to be hard to fill. Data for office staff indicated that posts for accountancy clerks, secretaries, shorthand typists and office machinery operators were not easy to fill.

A wide range of ingenious ideas for employment and self-employment opportunities are put forward in *What else can you do with a library degree?* (Sellen).[6] Material collected does, however, relate to the North American scene and is highly qualitative in nature. That is to say, it is heavily weighted towards anecdotal case history and individual success-story presentation. The book does however contain a brief report of a small-scale survey of (161) United States library-information workers. Results indicated that (as in the United Kingdom) actual first-hand experience of other occupations was fairly common amongst US librarians. The following quotations from respondents may also demonstrate a wide interpretation of professional role and a desire to expand (or even escape) it. The questions to which people responded were: 'Do you call yourself a librarian?' (60 per cent affirmative answer) and 'Do you consider yourself a member of the library profession?' (81 per cent affirmative answer).

Some participants in this study believed that the library-information profession was 'expanding to include all the information issues'. In this context, a broad definition of librarian was given, which included the 'information manager concept'. Other respondents expressed the view that all (other) occupations contained varying amounts of information work, therefore qualification, training and experience as a librarian should help one perform well in almost any job.

Opportunistic realists asserted that they were prepared to call themselves almost anything, including librarian or information scientist/specialist. Whatever description seemed most likely to get them jobs or explain their skills would be used, as circumstances dictated. In rationalising the ethics of such behaviour, it was also pointed out that 'there seems no agreement as to how to be identified', and that perhaps as a rough rule of thumb, one was only a librarian if one worked in something called a library.

Belief that the term librarian had less attractive and prestigious connotations than an information-based title was plain in many comments. The word librarian was thought to provoke an instant turn-off 'in the minds of business and industry clients'. In consequence, some of these American librarians preferred to call themselves information specialists. Despite evident ambivalence, the majority of respondents were nevertheless prepared to 'identify with being librarians and with the profession'.

Specific alternative occupations mentioned in the main body of this book included: archivist; the 'book industry' (publishing, editing, sales, promotion, index creation); 'computer specialist', systems analyst, co-ordinator of automation; fund-raising; information consultant, broker or 'fact-finder'; market research; marketing in general and new products in particular; new product management and development; museum curator; public relations; purchasing; records management; resource management.

The message to the motivated individual reader is to analyse your professional role and your personal contribution to it. What are the demands? What do you do habitually—and in particular what do you do well? Similarly analyse the content and demands of other occupations until you find a match.

A certain self-definition as a potential entrepreneur seems to emerge from the above apparently disparate listing, derived from people who had successfully analysed and matched. Little indication is given, however, in any quantitative sense of the openings available. How large, for instance, is the workforce in each of these fields? What are the current vacancy-to-unemployment ratios? How competitively would library-information workers be placed when applying for job vacancies within them? Before one can advise on alternative careers (as opposed to stimulating interest in the idea), one needs hard factual answers to questions of this kind.

Technological innovation and its impact lie on the periphery of the scope of this paper. Its primary influence here is as a factor, which in combination with economic recession in the 'developed' countries, has provoked this need to consider alternative careers. At the same time, information technology may create opportunities for some members of the library-information profession to expand their expertise inside and outside the conventional 'library' sphere of operations. It may also create rather more opportunities for the upgrading and skilling of what were previously clerical jobs in libraries, by the acquisition of computer inputting, online search and word processor experience.

The basic technological issue we face in the alternative careers context is that of intellectual displacement, which all depends on the reality and imminence of the development of artificial intelligence (AI) and the possibility of the 'post-industrial' world becoming not so much a service economy as a self-service economy.

Achievements in AI to date are tentative although experimentation continues. The end-products now tend to be called expert systems, rather than claim the status or title of artificial intelligence, which may be indicative of lowered expectations (at least in the short term). The RITA set of programs, which can serve as an online intermediary, is a simple front-end user-friendly expert system emerging from such research. RITA (Rand Corporation's 'Rule-directed Interactive Transaction Agent'), is cited as a random, rather than an isolated instance and provides the user with a language for defining intelligent interfaces to external data systems. Similar systems exist, like FRED (Front End for Databases).[7] A more dramatic and sophisticated example of an expert system in action has been provided by the Leeds University Department of Clinical Medicine.[8] Two diagnostic programs in BASIC have been created, which run on any CP/M-based micro. Accuracy in field trials was 91.5 per cent. The system is now being used by doctors in China, Japan, Pakistan, Mexico, and the US Navy. Although exciting and impressive, such developments represent a tolerant definition and low level of 'intelligence' (of which a reasonably dim hen might have good cause to be ashamed). We are still a very long way from even the unreliable Hal, extrapolated in *2001: a space odyssey*. Nevertheless according to Wight,[9,10] the technologically astute Japanese 'regard AI as showing such promise that their plans for computers for the 1990s are very largely based on AI'.

Wight also made two other pronouncements on AI of great relevance to the need for and feasibility of alternative careers. One contains a highly encouraging message: the other is most cautionary. Referring to 'the prospective pivotal role of AI' he asserts that 'in the absence of profound progress in AI there will remain much need for the intellectual and managerial skills and knowledge of librarians regardless of whether text media are paper or electronic'.

> The answer to the question of to what extent artificial intelligence can or cannot be applied to the intellectual activities of librarians and information workers (over the next 5, 10 and 20 years) has profound ramifications for manpower planning and forecasting. If it is found that relatively little of the intellectual work of librarians and information workers is conveniently susceptible to applied artificial intelligence, then the future livelihood of many of these workers is assured, regardless of whatever means of text display, storage and transmission may come into general use. If, instead, it is found that much or most of this intellectual work is conveniently susceptible to applied artificial intelligence, then these workers are likely to be displaced *not only from their present careers but also from most alternative professional careers, as*

> *these would be likely to be similarly susceptible to applied artificial intelligence.*

Our future then, according to Wight, may be better assured by remaining firmly within the (intelligently developed and adapted) profession, rather than by defection. This conclusion leads on naturally to consideration of the final assumption briefly questioned at the beginning of this paper. This concerns the long-term reality or persistence of any need to think about alternative careers at all.

Debate or even provision of alternative career opportunities is *per se* the pursuit of a temporary measure. Putting the basic issues crudely and simply, we believe that we have a surplus of qualified and/or professional level library-information workers. Therefore many of us seem to feel that we should explore avenues for their re-employment or redeployment elsewhere. However, this tactic (even if it proved possible) could only be a matter of short-term expediency. Background investigations, feasibility studies and attempts at practical action would need to be carried out quickly (to meet an assumed immediate or short-term need) or not at all.

As a topic of continuing concern the alternative careers option is a nonsensical preoccupation. It implies an illogical and wasteful state of perpetual overproduction. Such a situation would surely be more easily and rationally tackled at source by regulating production?

On the other hand, if absolutely nothing were done, the system would doubtless swing into a self-regulating mode in response to market forces. Admittedly, this would be at some cost in terms of human frustration and psychological wastage. Therefore there is a real need to do something soon to adjust reality, but not necessarily in terms of intensive alternative career exploration.

Of course, there is a sense in which broader underlying issues are highly relevant to our professional future, even to our survival. However, this leads us into areas of speculation which are perhaps more properly the province of high-level educationalists. Questions requiring resolution include: What is the basic aim of our profession in this fast changing world? What ecological niche exists for a remodelled profession? The real argument and issue is not the alternative career (which is in any case tacit admission of defeat, an invitation to a professional funeral). It concerns the design and actualisation of an alternative profession—altered, unified and updated in purpose, direction and modus operandi.

REFERENCES

1. SERGEAN, R. *et al. The Sheffield manpower project: a survey of staffing requirements for librarianship and information work.* Sheffield: Postgraduate School of Librarianship and Information Science, 1976.
2. SERGEAN, R. *Librarianship and information work: job characteristics and staffing needs.* London: BLRDD, 1977. (BLRDD Report 5321).
3. SLATER, M. *Career patterns and the occupational image.* London: Aslib, 1979 (Aslib Occasional Publication 23).

4. CONSUMERS ASSOCIATION. How you rate your jobs. *Which*, Sept. 1977, 489–93.
5. MANPOWER SERVICES COMMMISSION. *Report on hard-to-fill vacancies.* London: MSC, 1979.
6. SELLEN, B. C. *ed. What else can you do with a library degree?* Syracuse, NY: Gaylord Professional Publications, 1980.
7. CLARKE, A. *and* CRONIN, B. Expert systems and library/information work. *Journal of Librarianship*, October, 1983.
8. COMPUTER WEEKLY, **32** (800), 18 March 1982, 33.
9. WIGHT, A. The impact of technology on manpower requirements in information work: some findings of recent research. *In* TAYLOR, H. *ed. Information management and organisational change*. London: Aslib, 1981.
10. WIGHT, A. A discourse on issues: an exploratory study of the implications of information technology for UK library and information work manpower planning. London: Aslib, 1982.

INFORMATION SERVICES & USE

The Editors:

COR VAN DE WETERINGH, *Unilever Research, Olivier van Noortlaan 120, 3133 AT Vlaardingen, The Netherlands,*

ARTHUR W. ELIAS, *BIOSIS, 2100 Arch Street, Philadelphia, Pa. 19103, U.S.A.,*

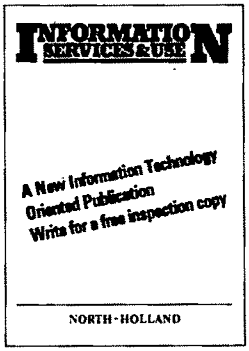
TAMIKO MATSUMURA, *National University of Library & Information Science, 2 Kasuga, 1-chome, Yatabe-machi, Tsukubagun, Ibaraki-ken 305, Japan.*

Advisory Editorial Board:

S. Abrahamsson *(Sweden),* **H. Aiso** *(Japan),* **F.R. Amport, Jr.** *(U.S.A.),* **C.W. Cleverdon** *(U.K.),* **G.W.P. Davies** *(Luxemburg),* **D. Gamble** *(U.S.A.),* **A. Gilchrist** *(U.K.),* **C.M. Goldstein** *(U.S.A.),* **A.N. Grosch** *(U.S.A.),* **M. Hlava** *(U.S.A.),* **A. Ichikawa** *(Japan),* **A.M. Mathijsen** *(The Netherlands),* **H. Nakai** *(Japan),* **M.L. Neufeld** *(U.S.A.),* **G.S. Revesz** *(U.S.A.),* **J. Sach** *(Poland,* **B.T. Stern** *(The Netherlands),* **Y. Tsuda** *(Japan),* **M. Weinstock** *(Australia),* **Ch. Weiske** *(F.R.G.),* **J.B. Whitehead** *(U.K.),* **D.U. Wilde** *(U.S.A.),* **B. Yates** *(Australia).*

Subscription Information:

1984: Volume 4 in 6 issues
US $77.00/Dfl. 200.00
(add US $8.00/Dfl.21.00 for handling/postage)
ISSN: 0167-5265


INFORMATION SERVICES & USE
A New Information Technology Oriented Publication
Write for a free inspection copy
NORTH-HOLLAND

INFORMATION SERVICES & USE was conceived as an information technology oriented publication with a wide scope of subject matter.

International in terms of both audience and authorship, the Journal is aimed at leaders in information management and applications in an attempt to keep them *fully informed* of fast moving developments in fields such as:

- *online systems*
- *offline systems*
- *library automation*
- *micrographics*
- *education and training*
- *videotex*
- *world processing*
- *telecommunications*

These areas are not only treated *in general* but also *in specific contexts.* Applications to business and scientific fields are sought so that a *balanced view* is offered to the reader.

Debates & Trends:
The Journal provides a lively forum for debate and a reliable source of information on events and people. Although its bimonthly schedule influences news reporting, the Journal offers *one single compendium of trend-setting developments that can be relied on.*

Concepts & Contents:
"Information Services" are considered by the Journal to comprise both the entities and the functions with which they are involved. These subjects are therefore considered distinct from information "uses" which are concerned with service *applications.* Under this concept, the Journal reports on intellectual processes for the organization of information, transformation techniques, media, economics and all varieties of services, including education and training.

Recent Papers:
Caruso, N. and E. Caruso, TRAINER — a computer tutorial for end-users of database services: context, content, and results of use;
Dijkhuis, W., Eyes and hands: an examination of keyboards and screens;
Dosa, M.L., The consultant as information intermediary;
Gunzenhäuser, R. and E. Horlacher, Telesoftware: applications in education;
Kunft, W., Experiments and experiences with packet-switched data networks;
Maurer, H., New developments in videotex and their implications for computer aided instruction (CAI);
Prentice, A.E., On-line training: the role of schools of library and information science;
Wolpert, S.A., A command language for the executive.

COUPON FOR A FREE COPY OF INFORMATION SERVICES & USE:

Send this form, or a photocopy to:

Elsevier Science Publishers
Attn. B. Wennekendonk
P.O. Box 1991, 1000 BZ Amsterdam
The Netherlands

or

Elsevier Science Publishing Co., Inc.,
Attn. Journal Information Centre
P.O. Box 1663, Grand Central Station,
New York, NY 10163, U.S.A.

Name ____________________

Professional Address ____________________

____

____

____

The Dutch guilder price is definitive, US $ prices are subject to exchange rate fluctuations.

6071NHc/JNULIS

NEW

Creating an information service

Sylvia P Webb

Setting up an information service, often with little assistance from support staff, can be a daunting task.

Recognising this problem, Sylvia Webb has written a practical guide which provides a step-by-step approach to the tasks involved.

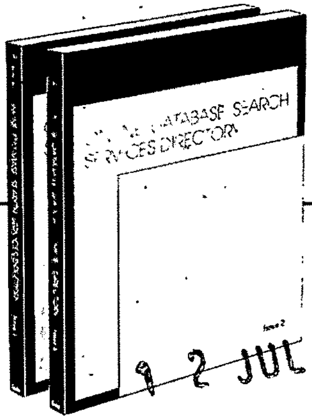
A series of checklists enables users to plan the information service most appropriate to their own needs. In addition, the book indicates:

* places to approach for information
* organisations offering short courses in information work
* suppliers of books, journals and library equipment

UK £9.50 (£8.00 Aslib members) Overseas £11.00 (£9.50 Aslib members)
ISBN: 0 85142 186 5

The Association for Information Management

Aslib 3 Belgrave Square
London SW1X 8PL
telephone 01-235 5050 telex 23667


ONLINE DATABASE SEARCH SERVICES DIRECTORY

12 JUL 1984

Online Database Search Services Directory

First Edition

...A Reference and Referral Guide to Libraries, Information Firms, and Other Sources Providing Computerized Information Retrieval and Associated Services Using Publicly Available Online Databases.

Edited by John Schmittroth, Jr., and Doris Morris Maxfield. First edition published in two softbound parts. Six indexes: organization name and acronym, online systems accessed, databases searched, subjects, searcher names, and geographic location. Part 1, just published, contains 634 entries in 575 pages. Part 2, ready Summer, will contain about 700 additional entries plus cumulative indexes to all entries in both parts. $75.00 for both parts.

A unique directory

The continued rapid growth of the online information industry has resulted in thousands of databases being offered through hundreds of online systems worldwide. *Online Database Search Services Directory* is being published in this time of diversification and increased demand to provide a link between the users in need of online information and the libraries or organizations able to search the particular databases that meet those needs.

OLDSS provides detailed descriptions of the online information retrieval services offered by public, academic, and special libraries, private information firms, and other organizations in the U.S. and Canada.

Detailed entries

Based on survey forms completed by the organizations, entries in *OLDSS* provide the following types of data: organization name, including specific department or service name if applicable ... address and telephone number ... year service started ... name of the key contact person ... number of staff ... approximate annual search activity ... online systems accessed ... subject areas searched (using 23 categories) ... frequently searched databases ... associated services (such as document delivery or reformatting of search results) ... service availability ... fee policy ... search personnel (names and titles) ... remarks (such as membership in online user groups) ... search request procedure.

Available on Standing Order at 5% discount.
All Gale books are sent on 60-day approval.
Deduct 5% if you send check with order.
Customers outside the U.S. and Canada add 10%.

GALE Research Co.
Book Tower • Detroit, MI 48226

To order by phone: **800-521-0707 tollfree.**
In Canada, Michigan, Alaska, and Hawaii: 313-961-2242.

Aslib Proceedings

VOL. 36 NUMBER 7/8 JULY/AUGUST 1984

THE FUTURE OF SECONDARY PUBLISHING

Aslib Biological & Agricultural Sciences Group Conference, London, 26 October 1983

Pricing of information products 289
Frances H. Barker

Secondary services for developing countries 299
John R. Metcalfe

A scientist's view of print versus online 309
John Chambers

Secondary publications have a future in libraries 317
Tom Norton

Publisher pricing policies and the reprographic copyright controversy 325
R. A. Wall

Letters to the Editor 333

Call for papers 334

ISSN 0001 253X

ASLIB PROCEEDINGS

Volume 36 **JULY/AUGUST** **Number 7/8**

Aslib Proceedings carries papers given at Aslib meetings and conferences, and contributed papers of interest to practising professionals. These describe innovations in information management techniques, applications of existing information products and services, and case studies of information units and special libraries.

Aslib Proceedings is published monthly and supplied free to members of Aslib. Annual subscriptions to non-members: £50 (UK)/£60 (overseas); additional subscription to members: £30/£35. Single copy prices and subscription information are available from the Subscriptions Department, Aslib, The Association for Information Management, 3 Belgrave Square, London SW1X 8PL.

Manuscripts and editorial enquiries should be addressed to the Editor, *Aslib Proceedings,* Aslib, The Association for Information Management, 3 Belgrave Square, London SW1X 8PL. Manuscripts should be 1,000 to 3,000 words, typewritten, double-spaced, single-sided on A4 paper. Figures should be reproducible. An abstract of up to 200 words should be included. References should follow British Standard 5605:1978. Published authors will receive twenty-five free offprints of their article.

Advertising information is available from the Editor, as above. Further information about Aslib's services and membership rates will be supplied on application to the Director, Aslib, The Association for Information Management, 3 Belgrave Square, London SW1X 8PL. Telephone: (01) 235 5050; telex: 23667 (answer-back Aslib G).

© 1984 Aslib and contributors

ISSN 0001 253X

Pricing of information products

Frances H. Barker

Assistant Manager, Marketing,
The Royal Society of Chemistry

Paper presented at the Aslib Biological & Agricultural Sciences Group conference, 'The Future of Secondary Publishing', British Museum (Natural History), 26 October 1983.

THERE IS NO DOUBT that the availability of machine-readable information products accessible by online means is posing a threat to the existence of printed information products. The reason is not that there is no longer a place for printed products, but that the shifting pattern of available products and usage is making it difficult to find the 'right' pricing structure. If the producer gets the pricing structure wrong, then the whole product—printed, machine-readable or otherwise—is in jeopardy.

The problem in essence is that printed information products are paid for by 'up-front money', and the product may then be made use of as the purchaser thinks fit (aside from the restrictions of copyright which we will consider later). For printed products, the producer can relatively easily estimate sales and set a price to earn the required revenue. However, with machine-readable online products the situation is just the reverse. In current practice, the only 'up-front money' for the producer comes from lease fees. The rest comes in dribs and drabs from a large number of 'small' users and a small number of 'large' users. Producer organisations would like to see the situation as represented in Fig. 1, with the income from a mixed printed plus machine-readable product range *exceeding* that from sale of printed products alone. However online users are not obliged to remain faithful to particular online vendors or databases, and may change from file to file and system to system in an attempt to obtain their information in the most cost-effective way. Estimation of online revenue likely from various pricing structures is therefore extremely difficult. This situation has recently been further complicated by the possibility of downloading information from a machine-readable source to an in-house store. Thus we reach the situation where unless the pricing structures are altered and restraints instituted, the end-user may obtain the equivalent of just that part of the hard copy he or she requires (i.e. a selective subset) at the prices set for ordinary online access, and the revenue from the mixed product range would fall *below* that from sales of hard copy alone. The producer would clearly be the loser under these circumstances. If the producer is the loser, then so ultimately is the vendor

Aslib Proceedings, **36** (7/8), July/August 1984, pp. 289–297. Printed in Great Britain.

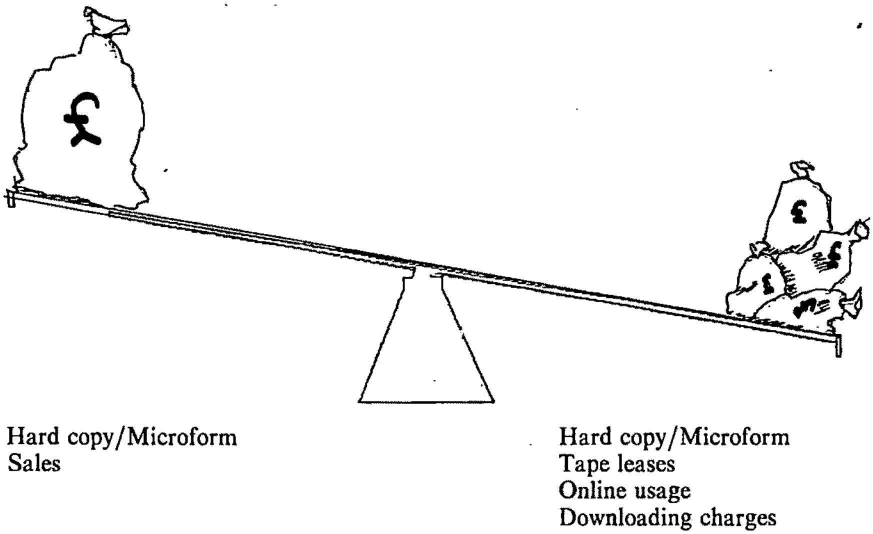


FIG. 1.

and the user, since if the product is no longer viable it is highly likely to disappear from the market-place.

A producer with a machine-readable database therefore has three options:

1. Sell only the printed version.
2. Release machine-readable subsets of the full version.
3. Release a full parallel (or enhanced) machine-readable version.

Fig. 2 shows the situation for Chemical Abstracts regarding printed products and machine-readable subsets and parallel products. Consider CA Condensates, Chemical Biological Activities, Chemical Titles, CA Search—all machine-readable derivations from Chemical Abstracts but none exactly the same as the printed product. The availability of such machine-readable subsets did not apparently have any marked effect on sale of printed CA and indexes. However, the signs are that availability of the *whole* CA base (bibliographic information, index entries, abstracts) with additional facilities in the CAS ONLINE system[1, 2, 3] would mean loss of hard-copy sales and selection of just the required subset of the information by establishments with defined interests.

This suggestion is supported by the work of Jansen[4] on EXCERPTA MEDICA, illustrated in Fig. 3. The shift in pattern of use where people can choose equally between printed and computer-readable forms appears to be 5 per cent loss of hard-copy sales per year with increase in online use of 40 per cent per year. This suggests that a period of at least five years is needed before revenue from the online product more than balances loss of subscriptions to the printed product, and ten years before the computer-

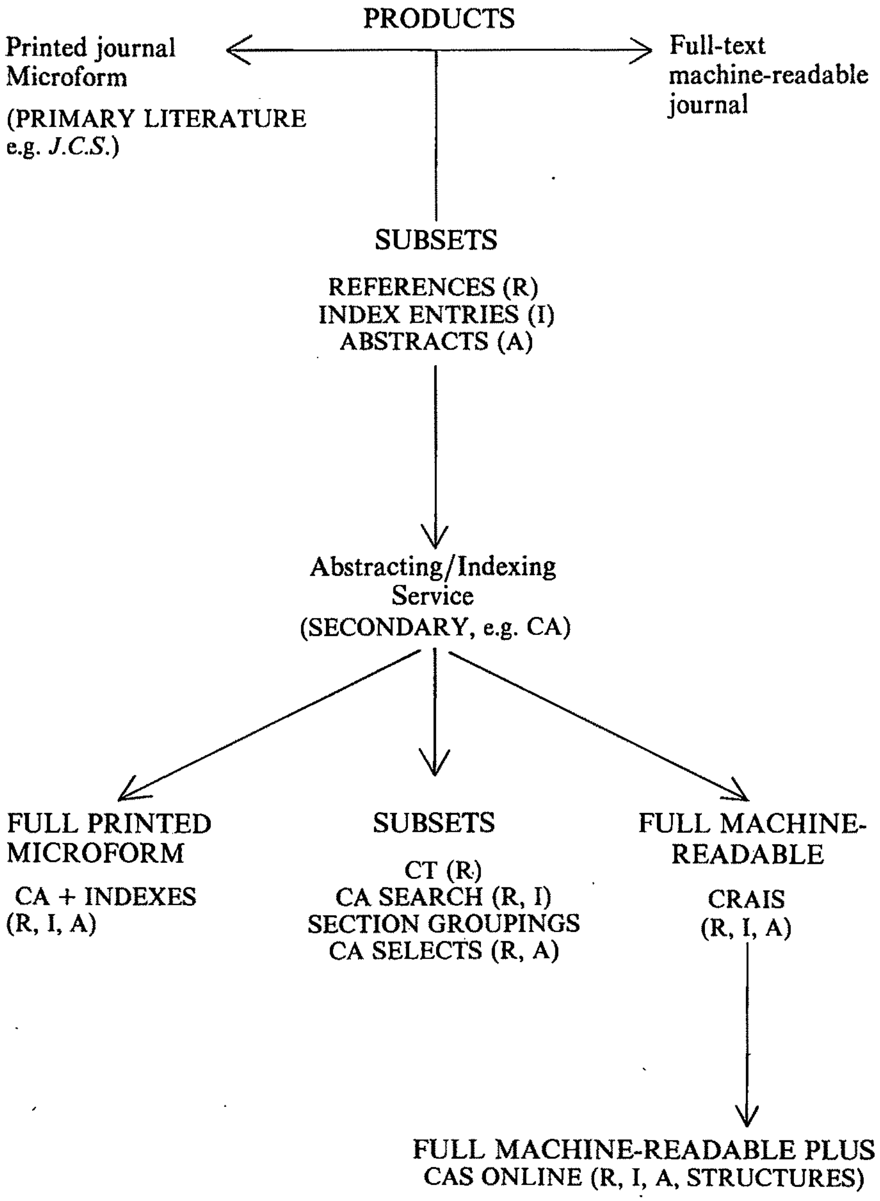


FIG. 2. *Chemical Abstracts products & subsets*

readable file becomes the major revenue-earner. All will be well if the changeover takes place in a controlled way and over a fairly long period so that the producer can adjust relative prices in accordance with the usage pattern. However if any factors cause a dramatic change in usage pattern then the producer may well end up in difficulties.

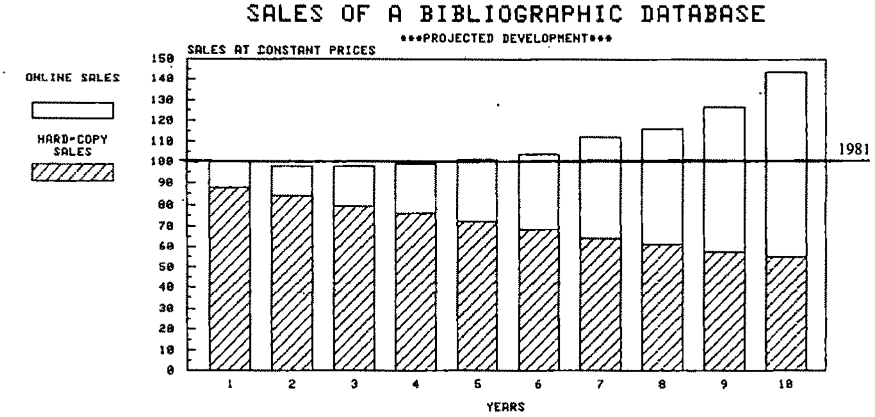


FIG. 3. *Sales of a bibliographic database*

Two such factors have been in evidence over the last three years. The first is introduction of machine-readable products which offer additional benefits not available from hard copy. A prime example is introduction of the online systems based on the CAS Authority files (Registry Nomenclature and Structure files) which allow true substructure searching—something not possible with printed and microform CAS products. The CAS ONLINE system (see Fig. 4) offers all features of CA Issues and Indexes and more. Thus movement to use CAS ONLINE rather than traditional CAS products is likely to be accelerated and the relative pricing must cater for this.

The other factor is 'downloading'—the ability to transfer online results directly in machine-readable form to a cassette, floppy disk or mainframe computer for further processing in-house. Fig. 5 shows two distinct levels of usage of downloaded material recognised by producers. The first involves mainly reformatting, editing and printing, and is no threat to online revenue. The second involves integration with in-house records or with output from other databases, and re-use of the information which does pose a threat to online revenue. Most producers are now either introducing or increasing online display charges or instituting a downloading charge to counteract this threat.

Fig. 6 summarises the 'channels' of products to users and revenue to producers. The user's aim is to obtain the *best value for money*, i.e. to use the funds available to obtain as much of the information required as possible

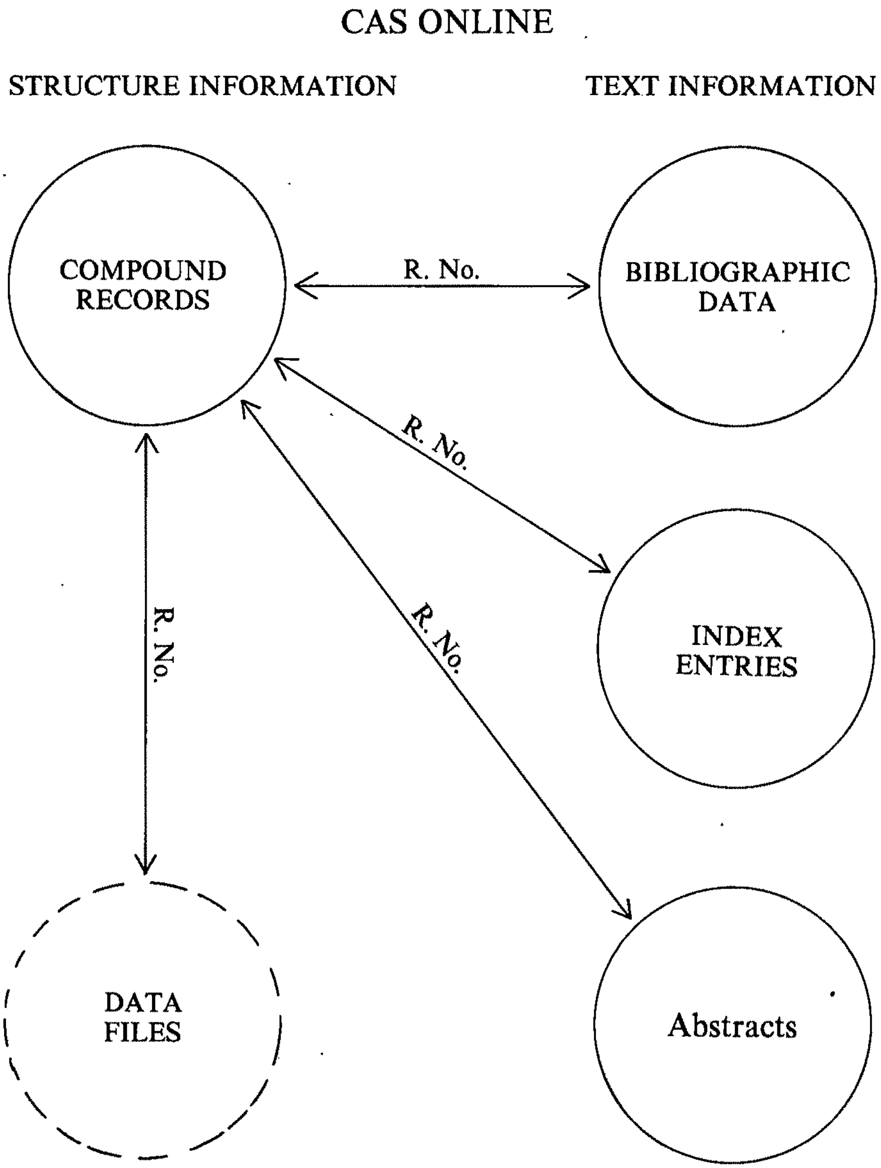


FIG. 4. *CAS ONLINE*

1. Editing, reformatting, integrating with other information, printing (destruction of c/r records).

2. Enhancing with other information, integrating with other records, archiving, searching (retention of c/r records.

FIG. 5. *Usage of downloaded material*

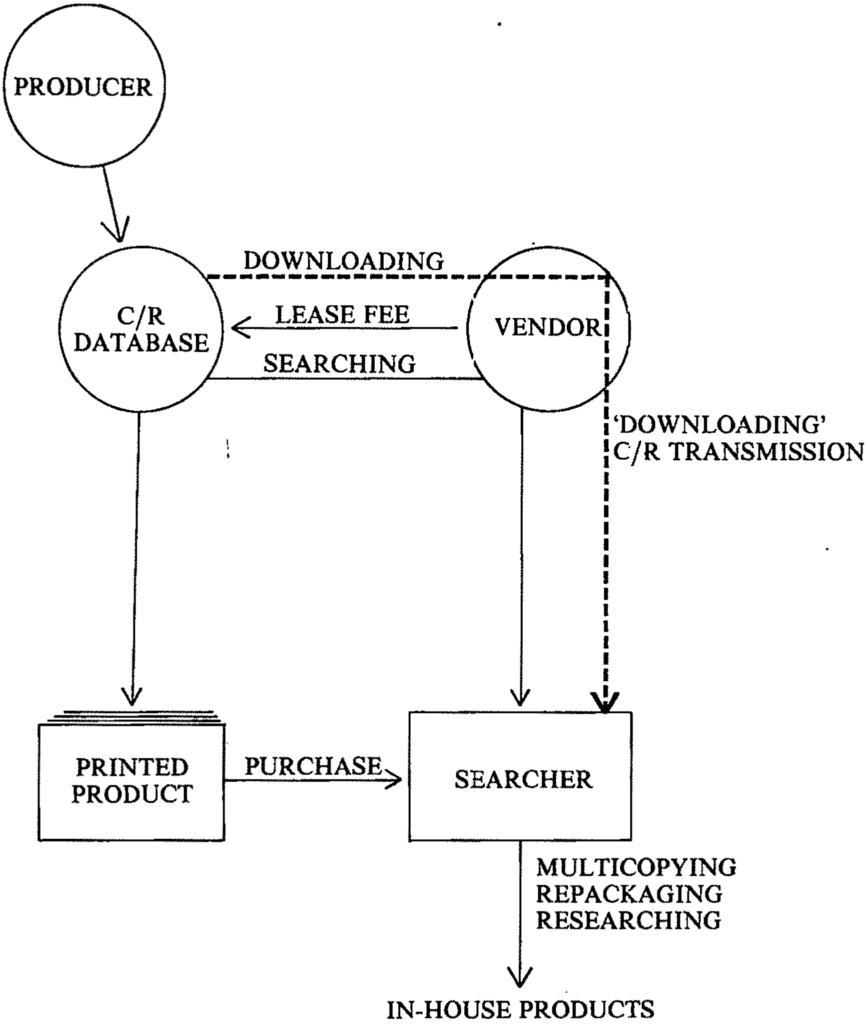


FIG. 6.

in the most convenient form. If the pricing structure allows it, users in developed countries may go over completely to computer-based services. However developing countries often have no choice but to stay with 'conventional' information tools. The producer's aim is to ***maintain revenue*** to cover the cost of the total operation. The producer must therefore carefully do the following:

1. First, calculate costs.
2. Decide whether to charge on the basis of 'market value' or on the basis of 'cost plus'.
3. Try to anticipate likely changes of pattern of purchase when the new form is introduced.
4. Decide on a pricing structure.

Points 2, 3 and 4 are elements in the calculation of revenue. Let us elaborate a little on these points.

'Market value' or 'cost plus'?

Market value is not a fixed or calculable quantity and often 'zero information' is valuable. With certain types of information, e.g. business/commercial data, one might choose to charge 'what the market will bear'. However, in most cases, pricing is done on a cost+ basis. With online searching, the user has to pay the combined producer cost *plus* vendor cost *plus* telecommunication cost.

Change of pattern of information acquisition

This is the most difficult area of all. The pattern of usage of online in preference to conventional services may be affected by many factors:

Cost

Ease of access
— command language
— help desk
— training

Convenience
— number of files available
— speed of delivery of offline prints
— advantage over conventional means of access
— possibility of downloading

So the pattern of use is affected by price, vendor, and online implementation. On the other hand, the price will be dictated by anticipated pattern of usage! In this 'chicken and egg' situation, is it any wonder that database producers have had to feel their way fairly carefully in the introduction of online access to their products?

Pricing structures

There are the several different approaches to pricing. We can list the following:

- Connect time + display/print charges (most major online systems)
- CPU time consumed in search
- Up-front fees for online access
- Flat fee for search or facility
- Differential rates depending on file type (e.g. NIH/EPA)
- Differential rates depending on search type (e.g. CAS ONLINE)
- Differential rates depending on subscriber type (e.g. Derwent Services).

Discussion

To summarise the above, the availability of complete records online and the feasibility of downloading the information to in-house computers, begin to put sales of large, complex (and hence high-priced) printed products in jeopardy. The hard-copy subscriber in developed countries begins to see advantage in going over completely to online use. The producer must look very hard at the relative prices of the various forms of the product, the sales in various parts of the world and the possible effect of downloading, and come up with an integrated pricing structure which is likely to earn the required revenue. The producer's aim is to earn enough revenue from one form of the product or another. It may be safer, however, to manipulate a slow changeover from the 'traditional' product to the new form, i.e. to retain as many of the existing sales as possible and attract a new market sector to online use. Steps must also be taken to control downloading leading to re-use of material to the extent that this is damaging to revenue. The way to do this may be:

- Reduce the hard-copy price (i.e. aim to hold a percentage of hard-copy sales)
- Allow concessionary rates to hard-copy purchasers
- Charge for cost of data online, rather than time of access
- Institute a downloading charge for anything except editing, reformatting, integration and printing.

The next question is 'What relative price levels should be set?' In working out the pricing structure, there are very many unknowns. We are not simply replacing a number of hard-copy sales by online access. If this were the case, the existing hard-copy buyers would inevitably pay more since they have to cover the cost of both the producer and the vendor. However, the hope is that there will be a new market sector which did not purchase hard copy before, but which will contribute to online revenue. In other words we should be replacing revenue from a relatively few hard-copy sales with a very large number of 'small' online users and a few 'large' online users. The questions the producer has to consider when pricing are:

- What is the total potential online market?
- How long will it take to reach this market?

— If online replaces hard copy, what effect will this have on revenue?
— Should we go for a high unit price and small number of subscribers, or a low unit price and a large number of subscribers?

We are already seeing the greater increases in price for machine-readable products than for printed ones (from Chemical Abstracts Service), and institution of downloading policies and fees by CAS, BIOSIS and others). And the effect on the user? The 'pure' printed-product purchaser may well see the price fall over the next few years or at least show a slower increase than the computer-readable products. The purchaser buying both printed and computer-readable forms should continue to pay more or less the same sum but the greater percentage will be paid for computer-readable files, and a new set of computer-readable users will be adding extra revenue. Downloading charges will simply balance revenue lost, from researching.

The choice of pricing structure will be influenced by the nature of the database. For the more familiar bibliographic search where time of search is reasonably long and number of retrievals is likely to be significant, then the connect-hour plus display charge is satisfactory. However, factual databases or databanks are not likely to earn sufficient revenue if this pricing structure is adopted, since the search is likely to be very short and the answers few. In this case access to and acquisition of a particular piece of information is valuable. The options of 'per search flat fees' or 'rate for the type of search' are likely to be chosen.

The options of differential rates for subscribers to the hard copy, or up-front fees to access files, are likely to encourage subscribers to retain hard-copy products or use them in preference to online. This will help to ensure that usage patterns change in the controlled way necessary to ensure maintenance of producers' revenue, and hence survival of the producer organisations and the wide choice of information products presently available to the user.

REFERENCES

1. FARMER, N. A. *and* O'HARA, M. P. CAS ONLINE: A new source of substance information from Chemical Abstracts Service. *Database*, December 1980, 10–25.
2. GILES, P. M. A new information source for pharmaceutical research. *Drug and Cosmetic Industry*, April 1982.
3. DITTMAR, P. G. *et al.* The CAS ONLINE search system. I. General design and selection, generation and use of search screens. *Journal of Chemical Information & Computer Sciences*, 1983, **23**, 93–102.
4. JANSEN, A. A. J. Effects of online use on total database exploitation. *Online Information 6th International Meeting, London, 7–9 December 1982.* Oxford: Learned Information, 1982. p.231–42.

Non-use of library-information resources at the workplace

a comparative survey of users and non-users of onsite industrial-commercial services

Margaret Slater

Under-exploitation of any service provided by an employer is a serious waste of organisational resources. It is therefore important to explore the reasons why people do not take full advantage of library-information services at the workplace. To this end Margaret Slater has studied three occupational groups (all in the industrial-commercial sector): chemists, engineers, and insurance personnel.

The qualitative study described in this report is set within the wider context of the whole potential user population. It does not focus solely on the non-user in isolation but contrasts the information-seeking habits, problems, attitudes, beliefs, and motivations of users, deliberate non-users, and enforced non-users (i.e. those who lack any library-information facilities at work).

Slater has isolated certain factors predisposing to unsatisfactory levels of usage and her results will be extremely useful to information providers. Management too should be equally interested in participants' comments on the causes and nature of more wide-ranging problems at work (not necessarily information-related).

This project was funded by the British Library Research and Development Department.

Aslib

ISBN 0 85142 190 3; iv, 164pp; 1984
UK: £12; overseas: £15.

Secondary services for developing countries

John R. Metcalfe

Director, Information Services,
Commonwealth Agricultural Bureaux,
Slough

Paper presented at the Aslib Biological & Agricultural Sciences Group conference 'The Future of Secondary Publishing', British Museum (Natural History), 26 October 1983.

Introduction

FEW PEOPLE attending this conference have ever visited a developing country, let alone worked in one. Used as we are to the cosseted environment of the developed world, we take much for granted. A few statistics from the *World Development Report* (1983)[1] will perhaps bring home to you the contrast between the developed and developing world (Table 1). For example, adult literacy may be low (26 per cent in Bangladesh); there are exceptions to this, as in Tanzania where literacy has reached 79 per cent, partly a result of Unesco's experimental World Literacy Programme and partly due to that country's own specific literacy projects.[2] A good indication of the standard of living and general prosperity is the GNP per head: this is US$140 in Bangladesh, but $2,220 in Brazil and $10,080 in Japan. The lower the GNP per head, the greater is the dependence on agriculture. In Malaysia, three-quarters of the population are associated with agriculture. World-wide, 700 million of the 'absolutely poor' live in rural areas; 280 million farm one hectare or less, mostly on land that is dependent on natural rainfall.

Improving agricultural production is of paramount importance to developing countries. Yet even where adequate resources for development are available, the obstacles to effective information transfer, or technology transfer, are formidable. In this paper, some of these obstacles are considered, and how they might be overcome.

Are secondary services relevant?

Given that the objective of developing countries is to improve the socio-economic conditions of their peoples, the question might well be asked whether sophisticated secondary services have any relevance at all. If by this we mean new technology, computers, telecommunications and all that, the answer is only a qualified 'yes': 'yes, but only in capital cities' or 'yes, but

Aslib Proceedings, **36** (7/8), July/August 1984, pp. 299–307. Printed in Great Britain

TABLE 1. *Some statistics for developing and developed countries**

Country	GNP/head $	GDP from agriculture (1981) %	Literacy %
Bangladesh	140	54	26
Tanzania	280	52	79
Kenya	420	32	47
Nigeria	870	23	34
Malaysia	1,840	23	60
Brazil	2,220	13	76
New Zealand	7,700	11	99
United Kingdom	9,110	2	99
Japan	10,080	4	99

*From *World Development Report* (1983)

not just yet'. In this paper, I have deliberately interpreted the term 'secondary services' broadly, to include not only conventional indexes, abstracting services, directories and databanks, whether computerised or not, but also that material, sometimes termed tertiary, which includes books, reviews, state-of-the-art reports, digests, and so on. These contain information which has been analysed, evaluated and reduced to a more digestible form so that it can be readily applied by the end-users, whoever they may be. This is not new technology but the very oldest, the ability of human beings to analyse facts and synthesise new ideas. What we are concerned with, therefore, is the whole process of information transfer; this is a vital component of all development work.

The users of agricultural information

Table 2 shows various types of users of agricultural information, which hold for developed as well as developing countries: (1) those intimately concerned with the detailed technology of crop or livestock production, i.e. the scientists, advisers and growers; (2) the planners, broadly responsible for agricultural policy; (3) the service area, i.e. the infrastructure for supplies of seeds, fertiliser, etc., for marketing the produce, and for providing credit; and (4) the teaching community, including both the teachers and the taught.

This assortment of users basically needs three types of information: detailed scientific data, summary data, and explicit recommendations. Let me give three examples. First, a scientist concerned with breeding new varieties of maize will want all the information he can get on gene pools, breeding techniques, varieties developed elsewhere, and so on; likewise, the agronomist

TABLE 2. *Users of agricultural information*

Group 1:	Research scientists
	Specialist advisers
	General advisers
	Educated growers
	Other growers
Group 2:	Manufacturers
	Bankers
	Salesmen
	Traders
	Journalists
Group 3:	Administrators
	Development planners
Group 4:	Teachers
	Students

will want to know about fertiliser reactions on different soil types, benefits of irrigation, pest and disease control, and different cultivation practices. In all, this is largely undigested information which the scientist has to sort out. Secondly, the planner may ask a more resource-orientated question. The Permanent Secretary in a Ministry of Agriculture may want to know what resources are needed to double production of maize, which regions would be most suitable for such development, and what the limiting factors are. This is downstream from the scientist's undigested mass of facts which require considerable study, analysis and evaluation before the Permanent Secretary can be given the answers he needs. Thirdly, the extension worker may need to answer a very simple question, 'When is the best time to plant maize?' The answer, perhaps 'the second week in May to catch the rains', may be the result of years of experience or scientific research. This range of questions and answers of differing complexity leads to the idea of classifying information resources according to the degree of consolidation that they represent.

Information resources for decision-makers

Information, essentially, is used for decision-making and problem-solving. Fig. 1 shows how the value of information is inversely proportional to the amount of information presented to the user.[3] Each of the steps up the ladder reduces or consolidates the amount of information presented, from the mass of primary literature that is the lifeblood of the research scientist to the simple 'do this, do that' recommendation that the grower needs. You should notice that as one progresses up the ladder to the sharp end, the information becomes more and more reduced or condensed, while the language in which it is presented becomes easier for the practical person to understand.

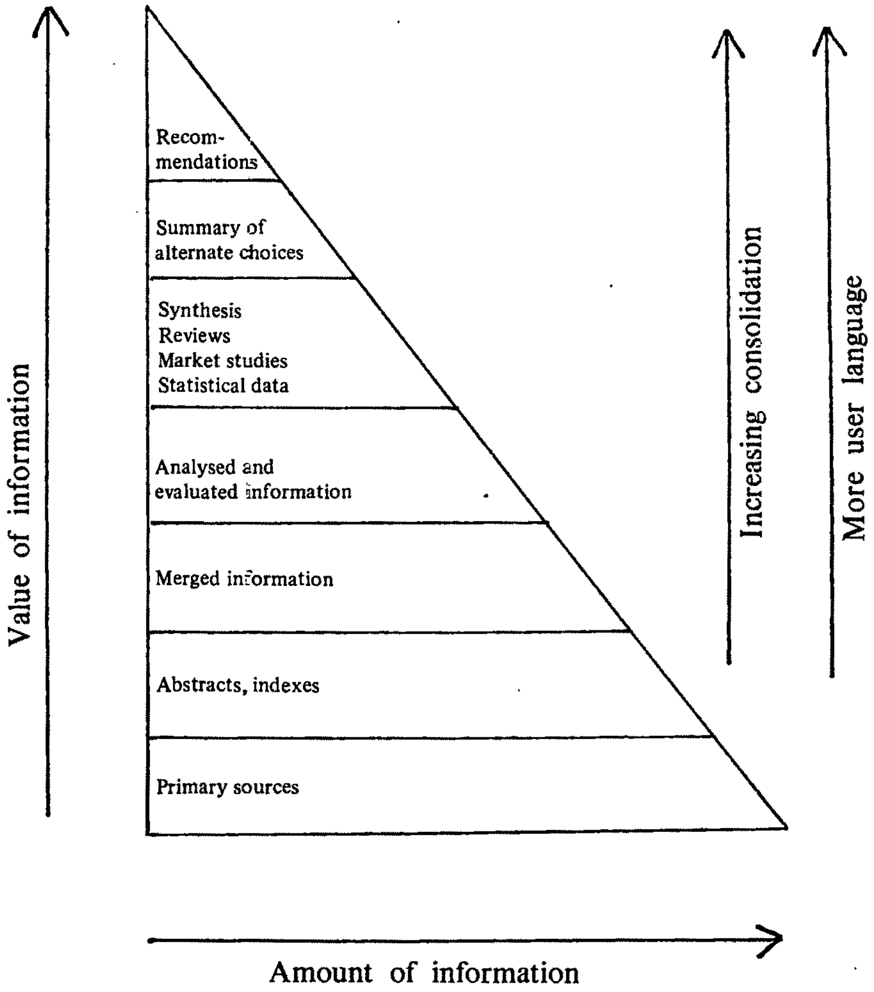


FIG. 1. *The value of information in relation to its degree of consolidation* (from Saracevic, 1983)

The process of consolidating information involves a number of steps:

- — collecting data
- — evaluating the findings
- — compressing the information
- — making sure the information is relevant
- — aiming it at particular user groups
- — ultimately producing reliable concise new bodies of knowledge.

This process is clearly time-consuming and therefore expensive, and for this reason has not always been given the attention it warrants. Cost-cutting at this stage can lead to bad decisions and expensive mistakes. For example, Hogendorn and Scott, writing about the ill-fated East African groundnut scheme,[4] conclude that a main cause of failure was that the operation was conducted without essential preliminary intelligence-gathering.

Important as consolidated information is for decision-taking, the best information in the world is no use unless it is effectively disseminated and adopted by the end-users. It is said that if you invent a new mouse-trap, the world will beat a path to your door. Not so. You have to market your mouse-trap, and so it is with information. This may be a matter of having a liaison officer at a research station whose job it is to interpret research data to extension workers. In a small area such as the Netherlands, these liaison officers are able to cover the whole country.[5] On the other hand, in India the Indian Council for Agricultural Research is investing heavily in Lab-to-Land projects and Agricultural Training Centres. In the former, technicians live as part of the community and are able to introduce new ideas and innovations, and themselves experience the difficulties, social and technical, that may arise.[6] In Nigeria, attention is being paid to conveying information to the appropriate member of the family unit.[7] It is no use, for instance, teaching the male head of the family how to improve maize production if this is work customarily done by women and children; the division of labour in family units and communication paths in the village must be fully understood. It is partly to overcome the communication problem that 'farming systems research' is now often advocated so that the labour and resources contributed by different members of a family unit may be understood. This may reveal the real problem areas which can then be researched by scientists brought down from their ivory towers, or, better still, resolved by sensible people applying a little common sense.

The pattern of information transfer in agriculture

In the agricultural sector, information transfer involves activities at many different levels: international, national; research scientist, extension worker; university lecturer, policy-maker. Yet all are interdependent, as shown in Fig. 2, where information is shown circulating at two levels. First, at the international level, the scientific community is conducting basic and applied research and recording data in databanks or in primary literature. The latter is then condensed in bibliographic databases and is accessed by the scientists using printed journals or online searches, backed up by libraries and document delivery services. Thus, scientific information readily circulates among its prime users, the scientists themselves, with systems that may be a bit cumbersome, but which nevertheless work. Secondly, national or subject specialised information centres provide information for extension workers, growers, policy-makers, etc. These centres draw upon local data whether statistical, scientific, or the result of survey, and they depend too on feedback from the users. Thus information, mainly orientated to problem-solving, is circulating at this second level. In addition, the two levels are linked: the specialised centres use data from the databanks and bibliographic databases,

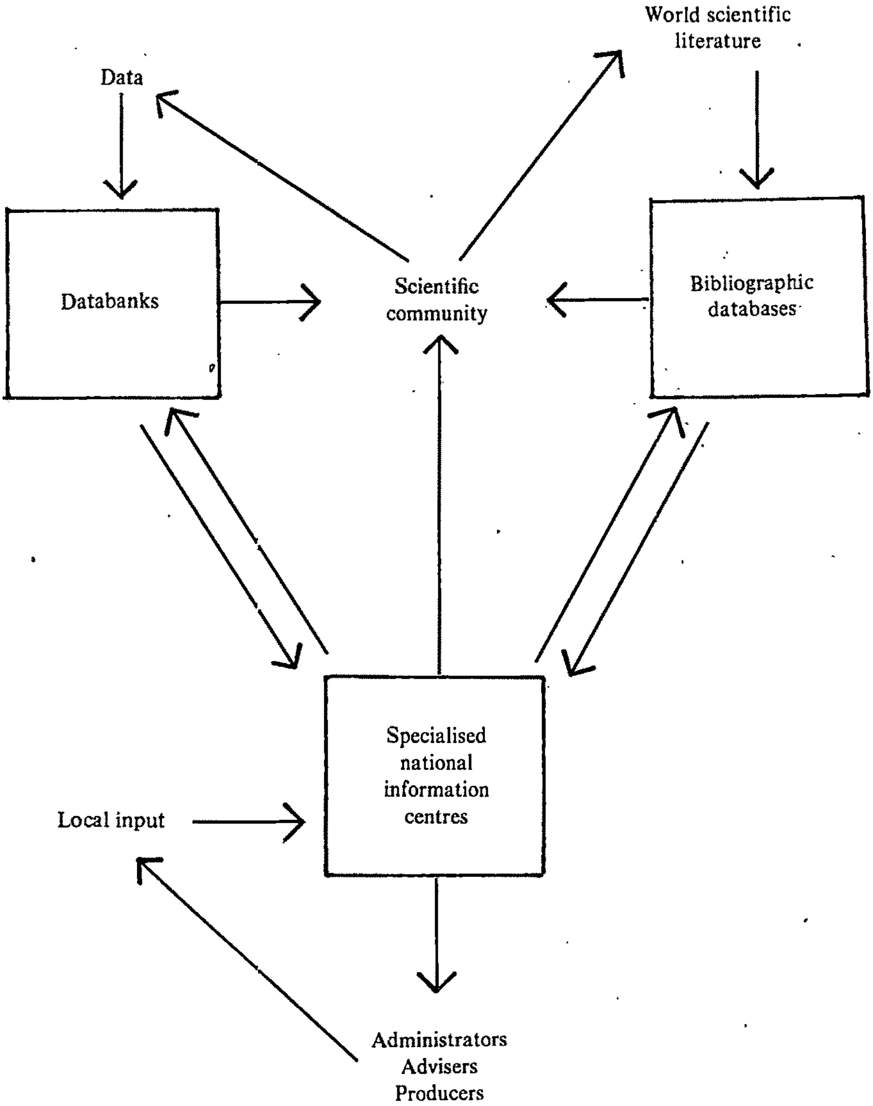


FIG. 2. *The flow of agricultural information at international and national level*

and can themselves contribute information to them. Thus these major secondary services are a vital component in the free flow of information.

How does the CAB Information Service help?
The main services provided by the CAB Information Service are shown in Fig. 3. Preparation of the database is of course the main activity, but others,

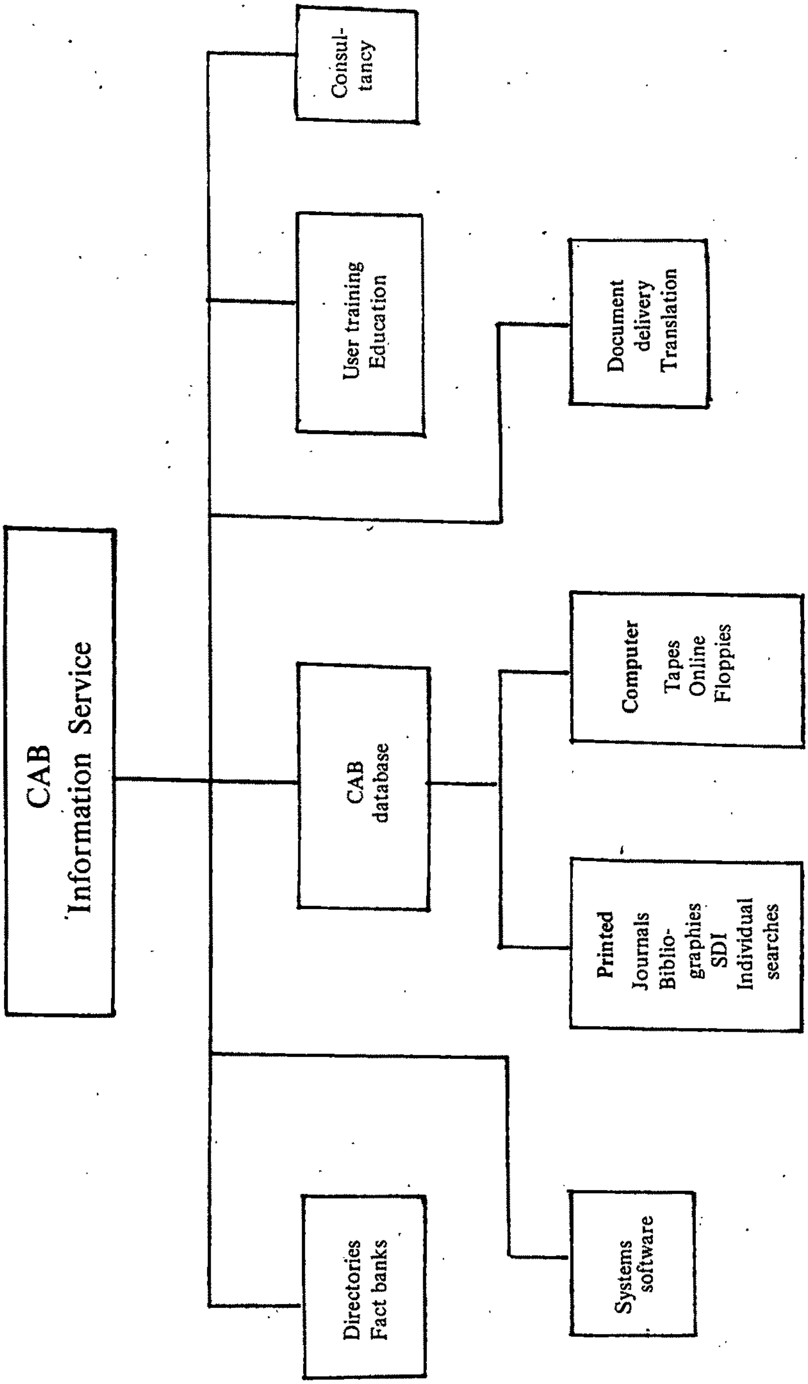


FIG. 3. *Services provided by the CAB Information Service*

book and directory publishing, digests and reviews, are important in certain areas, while back-up services in the shape of training, consultancy and computerised information systems are in increasing demand.

Cronin's survey of CAB database (abstract journal) customers[8] indicated the importance attached to a quality product: respondents were particularly interested in coverage and information content; a high rating was also attached to timeliness. With new technology for data capture and improved processing systems, CAB has cut months off the production cycle. Worldwide coverage of the significant scientific literature, information content and scientific integrity have been and will continue to be the hallmark of CAB products. Two examples justify this policy. First, a copy of *Rice Abstracts* seen in a college of agriculture in Hangzhou (People's Republic of China) was black with use after only one month on the library shelf. Secondly, we have recently negotiated a contract with the International Maize and Wheat Improvement Center (CIMMYT), Mexico, whereby CAB supplies 550 copies of *Wheat, Barley and Triticale Abstracts* for scientists in developing countries. It is hoped that this is indicative of increasing interest on the part of the funding agencies, such as the Consultative Group for International Agricultural Research, in CAB's ability to provide tailor-made services for developing countries.

The ultimate problem—who pays?

Many primary journals and abstracting services are financially self-supporting, serving as they do the relatively affluent scientific community. Developing-country scientists, whose library budgets may be limited, are the only exception, and, as we have seen above, their problem could be resolved by the provision of relatively trivial funding from international agencies. A much greater problem is the provision of consolidated information, and this by the nature of the product and of the clientele cannot be made to pay its way. The key to providing appropriate information in developing countries is therefore funding, either by local government or international agency. Information exists and has to be made accessible—if not, development is strangled.

REFERENCES

1. WORLD BANK. *World Development Report.* New York: OVP for World Bank, 1983.
2. SHENGENA, J. J. Tanzania's practice in adult education. *RRDC Bulletin*, **12**, 5–9.
3. SARACEVIC, T. Processes and problems in information consolidation. UNESCO/UNISIST 3rd Expert Working Group on Information Analysis and Consolidation, Kuala Lumpur, 12–15 September 1983. Typescript 29pp. 1983.
4. HOGENDORN, J.S. *and* SCOTT, K.M. The East African groundnut scheme: lessons of a large-scale agricultural failure. *African Economic History*, **10**, 1981, 81–115.
5. ROLLING, N. Agricultural knowledge: its development, transformation, promotion and utilisation. UNESCO/UNISIST 3rd Expert Working Group on Information Analysis and Consolidation, Kuala Lumpur, 12–16 September 1983. Typescript 31pp. 1983.

6. INDIAN COUNCIL FOR AGRICULTURAL RESEARCH. Annual Report 1982.
7. WILLIAMS, C.E. *and* WILLIAMS, S.K.T. Agricultural user population and information needs: a case study of the Badeku pilot rural development project in Nigeria. *In: Proceedings of the Congress of the International Association of Agricultural Librarians and Documentalists, Nairobi, March 1983* (in press).
8. CRONIN, B. CAB Abstracts: a global view. *Aslib Proceedings,* **32** (11/12), November/December 1980, 425–37.

The Application of Mini- and Micro-Computers in Information, Documentation and Libraries

Proceedings of the International Conference on the Application of Mini- and Micro-Computers in Information, Documentation and Libraries, Tel-Aviv, Israel, March 13–18, 1983

edited by CARL KEREN *and* LINDA PERLMUTTER, *National Center of Scientific and Technological Information (COSTI), Tel-Aviv, Israel*

CONTEMPORARY TOPICS IN INFORMATION TRANSFER, Volume 3

1983. xx + 802 pages. US $85.00/Dfl. 200.00 ISBN 0-444-86767-8

The papers published in these proceedings deal with various aspects related to the use and prospects of introducing mini- and especially micro-computers into information processing and distributed environments.

Keynote papers describe the broader issues such as forecasts of the future library environment and its impact on information users, producers and suppliers. The papers focus on various issues arising out of the broader availability of machines and advanced communication systems to information intermediaries and to end users. The problems and prospects of the emerging information age are emphasized.

CONTENTS: Preface. **Keynote Address:** Some Characteristics of Future Information Systems *(G. Salton).* **Session 1:** Hardware and Peripherals. **Session 2:** Description of Existing Systems. **Keynote Address:** Microelectronics and the Communications Revolution *(F.W. Lancaster).* **Session 3:** Application Software and Requirements (I). **Session 4:** Minis and Micros for Library and Information Science Education. **Session 5:** Applications in Chemistry: Graphic Retrieval Systems. **Session 6:** Improving Man-Machine Interaction. **Session 7:** Applications in Agricultural Libraries and Information Centers. **Session 8:** Applications in Education. **Session 9:** Problems of Developing Countries. **Session 10:** Application Software and Requirements (II). **Keynote Address:** Linguistic and Word-Manipulation Components in Textual Information Systems *(Y. Choueka).* **Session 11:** Applications in Libraries and Information Centers: General. **Keynote Address:** Impact of Microcomputers on Information Use Patterns *(M. Kochen).* **Session 12:** System Design Considerations. **Keynote Address:** Towards Three-D Chips and Orbitting Archive Super Libraries *(D. deSolla Price).* **Session 13:** Applications in Libraries and Information Centers: Technical Processing. **Session 14:** Minis and Micros for Online Searching. **Session 15:** Applications in Numerical and Factual Information. **Session 16:** Networking Aspects of Information Services and Libraries. **Keynote Address:** Changes in the Information Environment *(W. Rauch).* Author Index. Subject Index.

north-holland

IN THE U.S.A. AND CANADA:
ELSEVIER SCIENCE
PUBLISHING CO., INC.
P.O.BOX 1663
GRAND CENTRAL STATION
NEW YORK, NY 10163

IN ALL OTHER COUNTRIES:
ELSEVIER SCIENCE
PUBLISHERS
BOOK ORDER DEPT.
P.O. BOX 211
1000 AE AMSTERDAM
THE NETHERLANDS

US $ prices are valid only in the USA and Canada. In all other countries the Dutch Guilder price is definitive.
All prices are subject to change without prior notice.

1801NH/BK/LIBSC

A scientist's view of print versus online

John Chambers

Principal Scientific Officer, Slough
Laboratory, Ministry of Agriculture,
Fisheries and Food

Paper presented at the Aslib Biological & Agricultural Sciences Group conference 'The Future of Secondary Publishing', British Museum (Natural History), 26 October 1983.

Various searches conducted for the author have been used to illustrate specific points in which online searching is better or worse than a conventional search of hard copy. Advantages and disadvantages of both methods have been listed and suggestions made to overcome the present difficulties.

Introduction

THE AIM OF THE MAFF Slough Laboratory is to achieve the safer storage of cereals and foodstuffs by minimising their infestation by insects, mites and fungi. The work involves novel research in diverse areas so there is a relatively large need for searching the literature. The library facilities at the Slough Laboratory are second to none for the majority of staff, who are biologists, but costs dictate that they are less satisfactory for the smaller number of chemists. The provision of an online terminal has been of benefit to workers in both disciplines, though particularly to the chemists. Nevertheless, when the suggestion was made recently that our library no longer needed to purchase certain journals in printed form, I objected strongly. In this paper I attempt to explain my reasons for these objections.

First, specific points of interest will be mentioned. Some of these are direct comparisons between print and online methods while others are criticisms which apply to both. These specific points will be used to make lists of more general advantages and disadvantages of both print and online, and suggestions for some improvements. These are offered without restraint and it is left to others to decide what is actually possible. It is stressed that this paper is a personal view, although written in consultation with other scientists, and is presented in my capacity as an ultimate user (or customer). For a comparison of manual and online searching written by a librarian, the reader is referred to the excellent review by Johnston.[1]

What can be searched

A major advantage of online is its ability to search individually large areas where the overlap is small. For example, I was interested in using the technique of nuclear magnetic resonance (NMR) to measure the moisture content in various foods or cereals since this can influence their infestability. Searching Chemical Abstracts (1967–82) gave the following numbers of postings:

Aslib Proceedings, **36** (7/8), July/August 1984, pp. 309–316. Printed in Great Britain

1.	NUCLEAR(W)MAGNETIC(W)RESONANCE OR NMR	69,005
2.	WATER OR MOISTURE	273,794
3.	FOOD OR CEREAL	178,113
4.	1 AND 2 AND 3	64

The number of postings in each of the areas was very large whereas the overlap was very small. If this had been a conventional hard-copy search, it is quite probable that I would have given up before finding any of the 64 papers of interest.

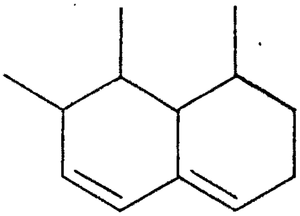
Another valuable advantage is that in searching for chemicals, structural features can be specified. I was attempting to identify the structure of a chemical which had been isolated from Pharaoh's ants and which was thought to be a pheromone (i.e. a substance which would influence the behaviour of other Pharaoh's ants). The chemical had a molecular formula of $C_{20}H_{32}$ and was a monocyclic diterpene with a ring size of 6, 10 or 14. I wanted to know what literature references there were to similar, model, compounds. In a print search it would have been necessary to scan some 116 different structures, all of $C_{20}H_{32}$, to see which would be suitable models, whereas online, because the ring size can be specified, only 13 structures had to be considered. An example of the limitations of the online method however was that it was not possible to search for DITERPENE because the chemicals are not classified by class. To emphasise the point, when AROMATIC was searched, only 12 chemicals were retrieved out of the 864,103 on file.

Choice of keywords

Chemical Abstracts overcame the nomenclature disputes of the International Union of Pure and Applied Chemistry (IUPAC) and others by inventing its own system of naming. Fig. 1 shows a structure which may be of use as an anti-juvenile hormone insecticide. I wanted to know how much was known about this compound and any analogues, so I searched Chemical Abstracts using the IUPAC name shown. When I retrieved no postings at all, I consulted the hard-copy Chemical Abstracts index and found that not only the naming fragment hierarchy but also the numbering was incorrect. Fig. 1 shows the three names for this same chemical which are acceptable to Chemical Abstracts, and which retrieved 72 postings.

Continuing with nomenclature, alternative names for the same chemical sometimes do not overlap. I wanted to conduct a search on BIOSIS (1969–83) for papers which mentioned the influence of hexanoic acid on insect behaviour. For HEXANOIC(W)ACID there were only 194 postings, but CAPROIC(W)ACID, an alternative trivial name which I thought was no longer used, had 1,044. Furthermore the number of postings for *either* of these two sets (1,236) was almost equal to their sum, showing that there is almost no overlap between the two alternative names.

Curiously enough this type of problem occurs with registry numbers too. The Chemical Abstracts system of giving different registry numbers to



IUPAC
1,7,8-TRIMETHYL-1,2,3,7,8,9-HEXAHYDRONAPHTHALENE

CHEM. ABS.

1,2,3,7,8,8a-HEXAHYDRO-1,7,8-TRIMETHYLNAPHTHALENE	
1,2,6,7,8,8a-	1,2,8-
2,3,4,4a,5,6-	4,5,6-

FIG. 1. *Alternative systematic names for the same chemical*

different stereoisomers of the same compound is ideal when such differences are important. However, in my experience, the shapes of molecules are all too often ignored and it is easily forgotten that there can be any isomerism. This is not intended to be a criticism of the index, but a reminder that customers must be fully aware of how to use the system. It is appropriate to repeat the old advice, that a search should always be started by consulting an index file to ensure that the name, fragment hierarchy and numbering are correct, and that as many synonyms and as many appropriate registry numbers as possible are used.

Searchers of biological areas can have problems too, for example in choosing which Latin names to use, these being changed occasionally and mis-spelt more frequently. Again it is necessary to start by consulting an index file, but is there a biological index file yet? Should compilers correct spellings or file under both the actual spelling and what they think it should be?

Use of keywords

While additional keywords can be suggested by consulting an index file, it is sometimes necessary to reduce their number and for this it can be helpful to analyse numbers of either postings or postings per year. (The latter are obtained crudely by dividing the number of postings by the years covered by each file.)

I was interested in the oxidative breakdown of glycerides and associated fatty materials since this seems to generate volatile materials which may influence the behaviour of our insects. I conducted a search using GLYCERIDE and various alternative keywords and mixed those with OXIDATION, AUTOXIDATION and various others. The total number of postings was 2,768. When mixed with REVIEW the number of postings was reduced to 217, which was still too many. Tables of postings per year for the glyceride part of the search (Table 1) and the oxidation side (not shown) suggested that the largest number of hits probably involved the keywords LIPID and OXIDATION. When these were eliminated, the number of postings was reduced to 54 which I considered to be acceptable. It is vital to remember that certain keywords have been ignored but a valuable feature of online searching is that the print-out contains an exact record of what has, and more importantly what has *not*, been searched. An analysis of postings per year horizontally across the table showed the same increasing trends for all of the keywords, and for REVIEW. This confirmed that none of the concepts included by the keywords had been renamed during the period under investigation. This can be a useful check, since within the NMR/moisture content search on hard copy I found that the name of the NMR technique had been changed twice.

TABLE 1. *An example of an array of postings* (Chemical Abstracts)

Years	1967–71	1972–76	1977–79	1980–81
1. GLYCERIDE	193	530	647	731
2. MONOGLYCERIDE	19	34	43	47
3. DIGLYCERIDE	19	38	43	46
4. TRIGLYCERIDE	106	269	283	320
5. FATTY(W)ACID	872	1,954	2,137	2,670
6. FAT	813	1,224	1,273	1,525
7. LIPID	1,261	3,066	3,771	4,788
8. 1 OR . . . OR 7	2,851	5,881	6,842	8,511
9. REVIEW	13,861	27,701	42,917	54,034

Choice of database

The NMR/moisture content search was conducted on various databases and the number of postings per year for the three areas on the various databases was different, as might be expected (Table 2). The overlap between the three areas however was virtually identical, and might be interpreted as meaning that it did not really matter which database was used to conduct the search. A closer examination of the various postings in the overlap, showed however that there is virtually no overlap between them. Thus the use of different databases retrieved different overlapping papers. In general, customers seem to have little knowledge of database differences and leave the choice to the library staff, so they may not be aware of individual database characteristics.

TABLE 2. *Postings per year for the same search on different databases*

	CHEM. ABS. 1967–82	BIOSIS 1969–82	CAB 1972–82	FSTA 1969–82	CRIS 1975–82
1. NUCLEAR(W)MAGNETIC(W) RESONANCE OR NMR	4,313	1,032	55	51	22
2. WATER OR MOISTURE	17,112	9,226	10,167	3,055	884
3. FOOD OR CEREAL	11,132	10,221	19,971	5,238	1,159
4. 1 AND 2 AND 3	4	4	4	6	2

Estimating recall

I find to my astonishment that many customers are not concerned about their search efficiency. Library staff must emphasise that this is important and that customers should make some attempt to estimate their recall (the percentage of relevant papers retrieved). A check should always be made that papers already known are found. It is also possible to check that appropriate references in retrieved papers are themselves found. Sometimes it may be possible to have a feeling for the number of papers that ought to be retrieved. For example, if AROMATIC is requested but only 12 postings retrieved, it is immediately obvious something must be wrong.

Precision

Not surprisingly, customers tend to be more aware of their search precision (the percentage of output postings which are relevant), and the levels which they accept vary widely. Values as low as 1 or 2 per cent can be acceptable when the information retrieved is very important. The fact that such low percentages can be acceptable brings the possibility of relevance which is unintentional. For example, returning to the search for model compounds of similar structure to the putative ant pheromone, further chemical work established that the ring size was definitely 14. This reduced the number of possible model compounds from 13 to 7. For amusement alone, the postings for these compounds were listed and it was found that one structure, for which there were 35 postings, had been referred to just 4 times as being a termite pheromone. This fortuitous discovery suggested that the compound might be biologically active in Pharaoh's ants too, and ultimately it did indeed emerge that this structure was identical with that of the ant compound. Thus serendipity is not the exclusive preserve of the print searching method.

Output format

Output is often confusing, repetitive and indigestible. It would be helpful if it could be arranged in order of keyword rather than chronologically within each file, if postings which have already been found on a different database, or even within the same file, could be rejected, and if greater use could be made of chemical structures presented in diagrammatic form rather than as text. Other improvements would include printing the output small enough to be stuck onto index cards, or even printing it directly onto index cards, and introducing a facility to order the hard copy of the full paper through the terminal.

Print—advantages and disadvantages

Advantages

1. The cost (including staff time) of actually conducting searches is roughly comparable for print and online methods. In my opinion however the online search may well require additional staff time to check its effectiveness, therefore in *total* cost print searching can be cheaper.
2. Searches can be conducted when library staff are absent.
3. It is easier to browse, to cover peripheral areas of interest, and to enjoy serendipity.
4. Print searching is also useful for scanning full abstracts, which are currently unobtainable on Chemical Abstracts databases, immediately after, or even during an online search.

Disadvantages

1. Storage is a problem, the space required may even impinge upon laboratory space.
2. Journals may be absent through borrowing or binding.
3. Searching for chemical structures is more difficult because certain structural features, for example ring size, cannot be specified.

Online—advantages and disadvantages

Advantages

1. The online method is faster than print, so it is possible to undertake speculative searches.
2. It is more up to date than print, sometimes to the point of papers not yet being obtainable.
3. It is possible to search individually large areas where the overlap is small.
4. It is especially useful where the subject to be searched is a minority interest of the library.
5. The customer's effort goes almost solely into *interpreting* the output rather than *obtaining* it, so much lower precision is acceptable and this can be important.

6. An analysis of postings per year ensures that there has been no keyword renaming, establishes the relative sizes of various fields, may suggest how they are changing with time.
7. There is a built-in record of exactly what has been searched.

Disadvantages

1. The quality of the file is wholly dependent on the quality of the compilers. In general their work is very good, but there are exceptions. For example, in a recent search to establish the number of publications in each year, we erroneously inserted 1985, ***but retrieved two papers!*** Another example is that the use of P after a Chemical Abstracts registry number to specify a preparation is not consistent. The fact that files contain errors may be well known by information scientists but it appears not to be known by customers, to whom it should be stressed.
2. It is much more difficult for both library staff and customers to learn how to conduct searches, because different hosts and different databases all have different quirks. Even within one file there can be so many different types of possible question that even when the searcher is well-practised postings can be lost.
3. It is too easy to exclude things unwittingly, for example, when two isomers of the same compound have different registry numbers, or when two names for the same compound are mutually exclusive.
4. It is easy to be insufficiently critical; for example, to think that a search has been thorough when in fact it has not. It is vital that library staff, and preferably customers too, be enthusiastically wary about online.
5. There are circumstances when retrieving no postings is a positive result—for example, when trying to prove that a chemical or process or project area is new. It is far more difficult to do this convincingly by online because it is so easy to get no answers for the wrong reason.
6. Output format can sometimes be difficult to plough through.

Improvements required

1. Earlier files should be introduced.
2. Improvements are needed in the methods of reviewing the compiling quality of files. Users should help to do this.
3. Positive steps should be taken to appoint library staff who are enthusiastic about online searching.
4. Library staff should be given sufficient time to keep up with changes in searching methods.
5. Library staff should insist that customers attend at least their first few searches. This would give customers a much better awareness of the shortcomings of the method, and allow searches to be modified more easily, although the presence of a fascinated scientist might cause a dramatic increase in connect charges.
6. Consideration should be given to instigating optional multi-choice routines to prompt the searcher with the larger number of questions which can be asked and thereby improve the breadth of the search.

7. A biological index file should be introduced, and the chemical index files could be improved by adding foreign spellings of names and specifying which of them are trade names.
8. Keywording could be improved by adding a vector or priority to keywords—for example, to distinguish between papers about mites feeding on birds from those of birds feeding on mites—and by allowing papers on methodology to be specified. At the moment such searches are swamped by papers with specific uses of methods. Author searches would sometimes be easier if it were not necessary to specify any initials and if it were possible to distinguish between sole and joint author papers.
9. Library staff must insist that customers check their search recall.
10. Specific output format improvements have been mentioned earlier.

Conclusion

In compiling the above opinions I have felt no need to conduct any search in parallel by both print and online methods since detailed comparisons of other searches have already been published.[1] Nevertheless, the points I have listed do serve to show that (in the view of at least one scientist) the online method, while having major advantages, has several pitfalls. If improvements can be made then I might have to accept, albeit grudgingly, that our library need no longer take certain journals in hard-copy form.

ACKNOWLEDGEMENTS

The author would like to thank Sue Costeloe, Tim Cullen and Geoff Fleet of the Slough Laboratory library for conducting the searches and for suffering with remarkable tolerance his persistent enquiries as a neophyte online searcher.

REFERENCE

1. JOHNSTON, S. M. Choosing between manual and online searching—practical experience in the Ministry of Agriculture, Fisheries and Food. *Aslib Proceedings,* **30** (10/11), October/November 1978, 383–93.

Secondary publications have a future in libraries

Tom Norton

Chief Librarian, Ministry of
Agriculture, Fisheries and Food

Paper presented at the Aslib Biological & Agricultural Sciences Group conference 'The Future of Secondary Publishing', British Museum (Natural History), 26 October 1983.

This paper addresses the relative merits of print and online from various aspects: the attitude of the enquirer towards a print or online information source; the structure and readability of information in an online and printed medium; the dangers of the control of the means of transmitting electronic information by governments and powerful interest groups. The virtues of printed publications for browsing and unstructured reading are discussed and examples given. The extent to which electronic information systems may become easier to use are briefly considered. The future of secondary publication is also considered and it is concluded that secondary publications are essential.

Introduction

When I looked at the summaries of the other speakers at our conference today, I wondered what there was left for me to say. Everything of importance on the subject seemed to have already been covered. Perhaps I should talk about the remote future; some distinguished members of our fraternity earn an honest crust doing so. The Director of Aslib does so with flair and panache. A rather good model to follow, I thought. Earlier this month I chaired a conference where Dennis Lewis gave the last paper of the day and his address was concerned with the future. At this conference we handed out questionnaires for the audience to give their opinions on the speakers—a dangerous practice, Mr Chairman, I am glad to see that you haven't copied it today. Dr Lewis' paper was very well received and there were numerous complimentary remarks. One member of the audience added the comment: 'Why is it that whenever I go to a meeting or conference, Dennis Lewis is there talking about the future?' The writer did add: 'Perhaps because he has something to say that we should all hear!'

The librarian's view

Well, let me try and say something I think you should hear. I've been asked to speak from the librarian's point of view on the subject of our conference.

Aslib Proceedings, **36** (7/8), July/August 1984, pp. 317–323. Printed in Great Britain

What I intend to do is two things: to pick up on some of the points made by previous speakers and expand on them, and to discuss some matters not dealt with. First, a definition: a secondary publication is any publication in either hard format (printed) or soft format (electronically distributed) which provides a guide or map to pre-existing documents.

Print and online

Let's explore further the matter of print and online. Dr Chambers has gone into considerable detail on the merits of print and online; he has shown how the one is superior to the other in particular instances. Online comes into its own when complex, multi-term searches are being carried out and there is the additional advantage of being able to produce at once a printed list of references obtained.

Another point worth considering is the use of the printed version for establishing search strategy before going online and thus saving on relatively expensive connect time.

Another factor worth taking into account is the behaviour of library users. I'm still amazed whenever I discover some people are actually afraid of librarians. We are such helpful, considerate people that it comes as a bit of a shock to discover this. I suppose part of the problem is that potential library users feel vulnerable when they have to admit they don't know something and they have to seek help from someone else, even someone as helpful as a librarian. This feeling of vulnerability can be lessened by doing a bit of preliminary browsing in printed sources. In other words, your library user can do some private research and perhaps decide what it is he or she needs to find out before approaching the librarian with the problem. In these circumstances the reference interview is likely to be a much more relaxed event than if the enquirer is still vague. Also, we have to admit that in some organisations, academic institutions for example, enquirers prefer to work alone and not to seek help from librarians.

Another important difference between online and print is in display features. Online is a very immature technology compared with a range of possibilities for the printed page. Computer displays impose severe design constraints and the successful presentation of information can pose some challenging problems. Much research has been done on the ergonomic aspects of the design of computer display equipment but not so much attention has been paid to the layout and typography of the information in the display. The main consideration is often the convenience of the presentation from the view-point of the computer system rather than from that of the user. Presentation is important for two reasons: first, the general appearance of the display is likely to affect the user's attitude to the information. It may influence feelings about whether the information itself is easy or difficult to use or even whether it is worthwhile attempting to use it at all. The old law about the accessibility of an information source determining whether it is used or not applies here. If information is difficult to use or appears to be difficult to use, then it will be ignored.

The second reason is that presentation can affect the speed and accuracy with which the information can be used. Badly presented information can waste the time of the user (and perhaps even the time of thousands of users).

This matter of design and display is a large one—a very large one indeed if one judges by the bulk of this tome called *The technology of text*[1]. Now there are obviously bound to be advances in the art and science of computer displays in the foreseeable future. However, I really cannot see that they will be sufficient to replace the printed page. Let us consider domestic teletext where great attempts have been made to use colour and layout to make the message attractive to read. I personally do not care to read this kind of display for very long in spite of the fact that my remote control gadget allows me to enlarge the top and bottom half of the screen display for easier reading.

We must look on the printed page as a technology ahead of its time. A book or periodical represents the ultimate in human factors design. There is an almost perfect match between the brain, the eye and the hand. If I may echo the sentiments of Edwin Schumacher, author of *Small is beautiful*, it is perfectly adapted to human scale and has the unimprovable excellence of the wheel. Like the wheel it will be around for a long time. Librarians must do their bit to ensure this by buying printed versions of indexing and abstracting services. Of course, you have to be sensible about this. You can't buy everything. You don't have the money or the space for storage. You must have printed versions of those services which are fundamental to the work of your organisation. It is difficult, for example, to imagine an agricultural library which doesn't subscribe to a substantial number of Commonwealth Agricultural Bureaux publications or a library in the defence or aerospace field without *International Aerospace Abstracts* and *Scientific and Technical Aerospace Reports* in their printed versions. These publications need to be available at all times for the kind of reasons I mentioned earlier and because you cannot allow your access to information to be determined by the vagaries of telecommunication links.

Print and democracy

I have been talking about what are essentially very practical matters regarding print and online. I want to now consider more speculative aspects of the subject. I mean the democracy of the printed word. Let us consider the possibility that the printed word could actually be replaced by computerised information retrieval systems; that some types of information would only be available in machine-readable form. There are two aspects of this to consider. The first is that if some cataclysmic disaster were to happen to our society it would be almost impossible to draw on our accumulated knowledge for the reconstruction of society if the knowledge was only in magnetic form. The printed word would be needed.

The second aspect to consider is the power held by those controlling computerised information retrieval systems. They are in a position to decide who may access their systems and they can arrange the price structure to exclude certain organisations or individuals. This may sound unlikely but at this very moment there is a dispute going on over the privatisation of British Telecom. Do we really want to rely on the goodwill of powerful interest groups where our information is concerned? Do we want to rely on electronic means of transmitting information when powerful interest groups can disrupt and control the flow? We must have a back-up in the shape of the printed word whose dissemination cannot so easily be controlled. There is an active underground press in many countries where freedom of expression is denied. It would be considerably more difficult to have an electronic *samizdat* in a society where the printed word has disappeared.

There are a couple of recent examples to illustrate the problem. The US Department of Commerce has prevented Chemical Abstracts Service and the Institute for Scientific Information from sending their information services on magnetic tape to Eastern European countries though there was no barrier to sending the same unclassified information in printed form. The official argument was that high-quality magnetic tapes should not be exported to countries which lacked the capability of producing them. Technology and information is sensitive and should not therefore be disseminated to the other side.

In 1982, you may recall, the Institut Textile de France withdrew its TITUS database from SDC and made it available only from a French host system.[2]

Information is increasingly being regarded as a 'commodity', a 'resource', and a 'strategic resource' at that. So such actions can be expected to continue.

Browsing tools

Now after that brief excursion I want to return to practicalities. I mentioned earlier problems of display and presentation with electronic media. The danger of excessive reliance on machine-readable information is that its structure inhibits browsing. You are aware of the expense involved and you tend to limit searches to items which satisfy pre-determined profiles. It is the same with SDI services. We must preserve the printed word. Even if it is composed and manipulated electronically, it must be possible to output it onto paper.

I am sure that most of you here use CABLIS[3] and I mention it here as a fine example of a browsing tool. Its principal virtue is that it is short. I find it takes me no more than five to ten minutes to scan it thoroughly and to linger over the items which catch my eye. It is varied in its presentation. There is a mix of news items, notes on new books and new periodicals, abstracts from *Library and Information Science Abstracts* (LISA), contents lists of selected periodicals, and additions to the Library Association Library. Varied presentation is very important in keeping the reader's interest. I have given up scanning LISA. Its presentation is much too uniform and dull and far too long. If I want to spend what I would regard as a reasonable length of time scanning it, then I have to confine myself to selected headings and thus I am likely to miss items I might find of interest if I went through the whole issue. Because CABLIS is short, I can go through a whole issue in a reasonable time. I found *The technology of text*[1] by doing just that and so discovering the best bit of professional reading I've come across this year. I might add that the personality of the editor of CABLIS has something to do with its readability. It's good to find the odd flash of humour in this type of publication.

Another publication in the same mould is *Oceanographic Literature Review*[4] which is, according to the editor, one of the few secondary publications which defines itself as a browsing tool first and a search tool only incidentally. According to an analysis he carried out of the readership of the journal, most of them do not rely on it in their immediate professional field but use it primarily for information in fields of secondary or sometimes of just personal interest. These fields only indirectly impinge on their work. So this justifies the selection of only core or general interest documents and removes the pressure to try to be comprehensive.

The editor goes on to say that the editorial task of collecting literature in this way is rewarding in a way that the mindless gathering of documents, pre-defined by some subject classification, could never be. Again, as with CABLIS, the all-important human touch is present. It is also the editor's opinion that publications like *Oceanographic Literature Review* will become common as it is increasingly realised that many problems are solved only by connecting the unconnected and that selective literature reviews can put the pieces on the table.[5] I would heartily agree with that. More of these kind of reviews are needed and the printed page is the best way of presenting them.

Print and electronic media serve different purposes. Electronic access is best suited to the retrieval of specific, definable bits of information, but it is not suited for browsing; for the sustained perusal of large chunks of text; for the kind of unstructured reading which we all need to do and which is unlikely to go out of fashion in the foreseeable future.

User-friendliness

As well as better display in electronic information systems, we need more user-friendliness, as in the words of a recent official report[6]:

> . . . there is a need for greater uniformity of approach, and simplification, so that users may be able rapidly to learn the search procedures for different databases, and for less formal modes of enquiry, enabling questions to be posed in a closer approximation to normal language. This development could come from work on Intelligent Knowledge-Based Systems (IKBS).

It seems to me that we need some consensus on a theory of information before such systems have a role to play. I have discovered very little that is comprehensible on the theory of information. I did make an attempt on Brooke's four articles on the 'Foundations of Information Science' which were published in 1980 and 1981 in the *Journal of Information Science*[7] but I am afraid I gave up half-way through the first one. However, I recently came across an article by Alan Gilchrist which starts from rock-bottom and is a good introduction to the subject. I strongly recommend it.[8]

Has secondary publishing a future?

The theme of our conference today is the future of secondary publishing. I suppose it is worth taking a few minutes to consider whether there will be secondary publications in the future. Is there the possibility or likelihood of only primary services in computer files? This is not likely. There will be searching of some full-text documents online, but there will need to be some form of secondary service. Secondary services will continue as a means of determining which full-text documents need to be searched. Abstracts or suitable substitutes will continue to play an important role in limiting the number of original documents which must be consulted. This will be true whether the documents are read by humans or computers. The purpose of secondary services will continue to be to save time and to provide a more effective search. Secondary services are filters which allow the majority of the reference to primary documents to pass through, yet capture the few which are pertinent to the particular search.

The librarian's job is to provide the appropriate mix of media needed to satisfy users' requirements and to provide a balance between printed and electronic formats. Maurice Line, Director-General of the British Library Lending Division, made the point well at the Library Association conference at Torquay this year when he said that though libraries had to be alert to the potential of electronic retrieval, there is some danger that these technologies might distort our perspective and distract us from doing well, preferably better, what we are designed above all to do—provide access to publications.[9]

REFERENCES

1. JONASSEN, D. H. (editor). *The technology of text: principles for structuring, designing and displaying text.* Educational Technology Publications, 1982.
2. NEUFELD, L. What's ahead for secondary services? *ASIS Bulletin,* December 1982, 40–43.
3. CABLIS: *Current Awareness Bulletin for Librarians and Information Scientists.* Published monthly by the Library Association Library.
4. *Oceanographic Literature Review.* Published monthly by Pergamon Press.
5. SHEPARD, F. C. The various roles of secondary publications (some thoughts). *International Journal of Micrographics and Video Technology,* 2(2), 1983, 101–4.
6. CABINET OFFICE. *Making a business of information: a survey of new opportunities. A report by The Information Technology Advisory Panel.* HMSO, September 1983. p. 29.
7. BROOKES, B. C. The Foundations of Information Science: Part I. Philosophical Aspects. *Journal of Information Science,* 2(3/4), October 1980, 125–34. Part II. Quantitative Aspects: classes of things and the challenge of human individuality. *Journal of Information Science,* 2(5), November 1980, 209–22. Part III. Quantitative Aspects: objective maps and subjective landscapes. *Journal of Information Science,* 2(6), December 1980, 269–76. Part IV. Information Science: the changing paradigm. *Journal of Information Science,* 3(1), February 1981, 3–12.

8. GILCHRIST, A. Information science (excluding information retrieval). *In:* TAYLOR, L.J. (editor) *British librarianship and information work 1976–1980, vol 2: special libraries, materials and processes.* Library Association, 1983. p.240–51.
9. Reported in *Library Association Record*, **85**(10), October 1983, 363.

Informatics 7

Intelligent information retrieval

Edited by Kevin P. Jones

Proceedings of a conference held by the Aslib Informatics Group and the Information Retrieval Group of the British Computer Society, Cambridge, 22–23 March 1983

Is there evidence of progress towards artificial intelligence? The pioneers of computing rapidly grasped the apparent potential which their technologies offered in this direction, even though the hardware and software then available were crude by comparison with that currently available for home computing; in the 1950s, Luhn was advancing algorithms for automatic abstracting and indexing, and others were heralding the advance of machine translation. By the standards of this early promise, the harvest of the early 1980s should have been vast, and such processes as much the norm as electronic calculating is today.

We know that this is not yet the case, but the papers included in *Intelligent information retrieval* do lead towards a cautious optimism. Commercial organisations as well as research projects are starting to operate intelligent information retrieval systems; and although problems remain, systems are being developed which will be of great value to all who have to handle large amounts of text in machine-readable form.

296 x 210mm; 149pp; 1984

ISBN 0-85142-187-3
UK £14.00 (£12.00 to Aslib members);
overseas £17.00 (£14.00 to Aslib members)

The Association for Information Management

Aslib 3 Belgrave Square
London SW1X 8PL
telephone 01-235 5050 telex 23667

Publisher pricing policies and the reprographic copyright controversy

R. A. Wall

Deputy Librarian,
Loughborough University of Technology

A SURVEY OF SCHOLARLY and research journals by Fry and White published in 1976[1] resulted in a searching study of price changes and publishing economics generally. This paper will note such comments as bear upon differential pricing for institutions and individuals. A shift among US subscribers from individual to institutional subscriptions (as a percentage of total sales) was remarked upon for all except a group of publishers described as 'Other not-for-profit', the main categories being Commercial, Society, and University Press. These 'Other not-for-profit' journals 'cost least of publisher groups' and 'may be more affordable by individuals'. The general growth in institutional compared with individual subscribers was to be expected 'as increased prices forced individuals to drop their own subscriptions and rely on copies available through the library'.

This may have been at least a partial cause, or even the entire cause, of an increase in the application of differential subscription rates for institutions and individuals. Commercial publishers with this policy apply it to their less-expensive journals 'but then charge institutions at more than twice the rate charged to individuals, a gap which is continuing to spread'. However, the situation was found to be quite complex, with policy variation between different types of publisher and sometimes within one type: for example, 'societies tend to publish their lower priced journals at single rates, and use differential individual and institutional (library) rates for more expensive publications. The difference . . . is nowhere near as great as for commercial publishers, and is not widening'. Between 1969 and 1973, the percentages of the several publisher types that charged differential rates nevertheless fell somewhat in all except the University Press group, where the percentage rose from 54.8 per cent to 64.5 per cent. This sector was found to be planning further spread of the policy. Commercial publishers were also found to be planning greatly increased use of the policy. Society publishers apparently had no need of such plans. Differential pricing was referred to by Fry and White as 'a tactic to increase revenue', but again there was complexity: 'Generally, no publisher group demonstrates any clearly defined tactic, past or future, except for the increase of subscription rates'. Diminishing advertisement revenues have contributed to this trend by forcing greater reliance upon subscriptions income. But it was commented that:

Aslib Proceedings, **36** (7/8), July/August 1984, pp. 325–332. Printed in Great Britain

> Individual subscriptions to scholarly and research journals decline steadily for most publisher groups for the period 1969–73, perhaps because individuals can no longer afford the increased rates. As an attempt to offset this trend, and perhaps as a compensation for anticipated interlibrary loan and photocopying, many publishers have increased the institutional prices (primarily charged to libraries) to a greater extent than individual prices.

In the UK, where Public Lending Right has become established, the notion of paying more for multiple-use situations is no longer strange, but the proportions charged would seem partially responsible for the regular cycle of price increase, library subscription cutbacks, and further price increases. In other words, it could well be the pricing policy which is to blame for reduced library subscriptions, bearing out other surveys (Woodward[2], Line Wood[3], White[4]), and not interlibrary loan or photocopying except as effects following upon the cause. Should publishers be instituting their own unofficial PLR, which would not in principle seem so unreasonable when serials usage (within a library) is virtually impossible to monitor, the question that arises is whether this money should be coming of library budgets or out of national PLR funds? And, if anticipatory photocopying charges are really being made, is their size based solely on the *publishers'* estimate of extent and legality, rather than that generally accepted by users? It would seem desirable for publishers to state the philosophy behind their policies, when a differential pricing tactic has been adopted (*see* Afterword).

In 1983, Liebowitz wrote about the effect of what he calls 'price discrimination' upon copyright law and photocopying[5], making the point that 'copyright holders are presently receiving greater remuneration than is generally understood'. He quotes, from Fry and White, some percentage price increases of differential subscriptions during 1969–73, but goes on to report his own study. Though small, confined to '54 leading academic journals' as at 1970 and 1978 respectively, the results would seem interesting:

1970 ratio inst./ind.	1.26
1978 ratio inst./ind.	1.66

with a 'significance level' of 99 per cent in both cases. Liebowitz comments: 'One cannot be certain as to the causes of this increasing price dicrimination but its concurrence with increased photocopying would seem to be more than coincidence . . .'

Liebowitz considers the photocopying debate to have neglected 'the important market adjustment of price discrimination', and concludes that: 'The justifications for enhanced copyright protection are weakened by price discrimination'; but he points out that discriminatory pricing is threatened by computer systems and electronic journals which will probably result in flat-rate use fees.

A sample of 171 journals has been studied at Loughborough University of Technology Library. Without details of Liebowitz's method of choosing his sample, the reliability of comparison between his figures and those below is not known. Instead of first arriving at mean prices like Liebowitz, because this was thought potentially unsatisfactory, the LUT study derived an institutional-to-individual price ratio directly for each title found to practise discriminatory pricing, then arrived at mean ratios within groups and overall. Assistants were asked to identify from current display periodical shelves for DC300, 500 and 600, the titles showing separate prices for institutions/libraries and individuals, omitting many membership situations and excluding second-copy discount arrangements like that of Pergamon. *'Advances in . . .'* and other annuals, and abstracts/indexes, were also excluded. The sample details are:

DC class	**300**	**500**	**600**	**TOTALS**
UK	47	10	6	63
US	46	22	23	91
Netherlands	3	4	1	8
Other	4	1	4	9
TOTALS	100	37	34	171

These made up 17.85 per cent of the library's subscriptions to journals in these subject classes. Since *all* titles taken that showed differential pricing were studied, as stated above, the total population must be regarded as the totality of journals classifiable as DC 300, 500 and 600 that are of potential interest to UK universities; very roughly estimated at 60,000.

The overall summary of the LUT study is as follows:

No.	No. in quartiles of range of ratios				Range of ratios	Mean ratio	Median ratio	Mode
	(<1.87)–2.11	–3.07	–4.03	–5				
171	(94) 134	32	3	2	1.15–5	1.87	3.08	2

The mean ratios for UK and US separately are 1.86 and 1.85 respectively. There is taken to be 95 per cent confidence that the mean ratio for cases in the 60,000 titles is in the range 1.79 to 1.95. Similarly, there is 99 per cent confidence that the mean ratio for cases in the 60,000 total would be in the range 1.76 to 1.97. Other points noted during the survey are included in the Appendix below. Anyone wishing to extend the survey may obtain further details from the author (*see* Afterword).

Should the Loughborough figures be regarded as statistically comparable with those of Liebowitz, one notes a continually expanding gap being illustrated, as the ratio between institutional and individual prices has grown from 1.26 in 1970, through 1.66 in 1978, to 1.87 in 1984.

The idea that, where discrimination occurs, libraries are now paying, on average, 87 per cent more than individuals for commercially published serials must seem appalling to librarians, at least at first sight. But the publishers' view must also be considered. It is hardly surprising that, finding individual subscriptions falling, they should turn towards the services used by those individuals in order to maintain economic viability.

However, it is a source of continued frustration to librarians that serials prices have spiralled at a greater rate than inflation, causing repeated rounds of 'cutbacks' despite the need and preference for continued subscription. It would be more than frustrating if discriminatory pricing were indeed found to be a form of unofficial PLR and covert photocopying charge, especially after all the publishers' lobbying about photocopying in recent years.

In complete contrast to the photocopying lobby is the readiness of many publishers to give permission for multiple copying of serial articles for educational purposes, which seems a most laudable and far-sighted policy on their part, bearing in mind the place of education in the communication 'loop' of authors, publishers, and users becoming themselves authors. A common university library problem is meeting the high peaks of demand for tutor-cited papers. Some students make their own photocopies. Others, fortunately few at present, vandalise the original and the paper is then virtually lost to the rest of the group. Most find it almost impossible to get access to a 'popular' reference within the timescale required. Hence the academic library 'short-loan' collections of high-use periodical articles and books, copyright permission being obtained when photocopying is involved. An example of what can be done to improve student access to selected items came to light recently: one university library is preparing photocopy 'packages' requested by tutors for particular courses, and at least 80 per cent of publishers, including some large commercial ones, ask no fee. Some seem to be uncertain as to their exact policy but, where a fee is charged, the average is between 2 and 3 pence per page. Book publishers are apparently more likely to charge than serial publishers. A significant number of publishers have said they do not need to be asked again. In another university, a professor has written to many serial publishers relevant to his subject area to request blanket permission to make multipie copies from time to time of any articles needed for short-loan collections, and 62 out of 72 have agreed without fee. This kind of experience is by no means uncommon, yet the publishers' pro-licensing lobby, concentrated in the activities of the Copyright Licensing Agency, is continually pressing the educational world to enter licensing arrangements which would involve quite high rates of payment whether required or not by individual publishers. Are the generous publishers enlightened regarding the cause of education? And/or saving themselves future administrative costs of handling small transactions? And/or do they feel that, because they practise differential pricing of some kind (whether as studied herein or via membership arrangements), the multiple-use context is well enough compensated for already? Academic libraries are certainly very pleased to have royalty-free copying permission, but would prefer (a) to cut administrative costs by having a clearly understood publisher policy demonstrated; and (b) to know just what proportion (if any) of differential prices is in effect contingency payment for photocopying.

It must be remembered, of course, that publishers are entitled to arrive at their own marketing and pricing strategies. The PLR question is however commended for the attention of the appropriate authority, for library budgets should not be made to suffer. Although *'Advances in . . .'* serials were excluded from the survey, it was noted that, for example, the JAI Press Inc. 1984 Subject Catalog of 'Research annuals in computer science and related fields' shows twenty titles, each of which has an 'institutions' price double that for 'individuals'. If a component of a discriminatory cost is indeed for photocopying, the publishers concerned should either withdraw support from the pro-licensing lobby or define instead a photocopying 'mark-up' (which should be subject to arbitration) on the individual subscription rate as an alternative to royalty payments for copying within limits determinable by a code of practice[6]. As with serials, book prices are inflating at a much greater rate than the RPI. The effect of this on purchasing power in the last twenty years has been profound and the National Book League, as well as, indeed, the Publishers Association, has been prominent among those expressing great concern.

Unlike serials publishers, however, book publishers do not seem to blame photocopying for falling sales. Publishers must know well enough that libraries prefer to buy hard-cover editions because soft-cover ones are so subject to wear and damage as to be a waste of money. Yet the differential between hard- and soft-cover editions would seem many times more than the cost of binding. No survey was made for books, but a spot check of UK and US listings revealed ratios varying from 1.32 to 4.12 with an average over twenty examples (picked at random) of 2.1. UK examples had the larger differences between hard- and soft-cover prices, ranging from £8 to £33. Some study to determine whether this particular gap is widening would be useful.

Some serials publishers now state their individual subscriptions as 'discounted' from the institutional rate, which seems to have become the standard. Is this 1984 double-think, or is it the right way to look at the situation? How long, then, before the prices of soft-cover books are said to be discounted from the standard hard-cover prices? We must remember though, that the designation of very cheap 'special student editions' in soft cover, which are then sold to anyone who wants them, not just students, has been going on for years and could be regarded as the same kind of discounting.

Academic and learned society publishers may well be in dire straits, as declared by the Royal Society study[7], but it would seem doubtful that commercial publishers are suffering similarly. Has a situation evolved in which serials publishers are in effect vying with book publishers to get as large a share as possible of library budgets? If so, no-one can win and the quality of library service, and therefore all users, are the certain losers.

REFERENCES

1. FRY, B. M., *and* WHITE, H. S. *Publishers and libraries: a study of scholarly and research journals*. Lexington (Mass.): D. C. Heath & Co, 1976.

2. WOODWARD, A.M. *Factors affecting the renewal of periodical subscriptions: a study of decision-making in libraries with special reference to economics and inter-library lending.* London: Aslib, 1978.
3. LINE, M.B., *and* WOOD, D.N. The effect of a large scale photocopying service on journal sales. *Journal of Documentation*, **31** (4), 1975, 234–45.
4. WHITE, H.S. Factors in the decision by individuals and libraries to place or cancel subscriptions to scholarly and research journals. *Library Quarterly*, **50** (3), 1980, 287–309.
5. LIEBOWITZ, S.W. Price discrimination by journal publishers: its impact on copyright law and photocopying. *European Intellectual Property Review*, 7, 1983, 184–89.
6. Draft rights owners and users joint code of photocopying practice for materials other than music, proposed by Aslib, The Association for Information Management. Insert in *Aslib Information*, **12** (3), March 1984.
7. *A study of the scientific information system in the United Kingdom.* London: The Royal Society, May 1981 (British Library R&D Report no. 5626).

APPENDIX

Other points noted during the LUT. survey

1. Pergamon Press appears to have a common policy for almost all its serials. Subscriptions are quoted as applicable to 'libraries, university departments, government laboratories, industrial and other multiple-reader institutions'. However 'Any individual whose institution takes out a library subscription may purchase a second or additional subscription for their personal use at the much reduced rate of . . .' where the reduced rate is quite low. At LUT, those found varied from $35 to $90, which represents considerable 'discounting' from the 'library subscription', apparently regarded now as standard.

   This policy seems to date from 1969. A 1968 example (*International Journal of Engineering Science*) has a similar phrase for 'library subscription' but the individual price (ratio 5:1) is not confined to additional copies to institutional subscriptions. Pergamon serials were therefore excluded from the sample. Incidentally, one Gordon and Breach journal in 1983 commenced a similar policy to Pergamon's.

2. Society publications' membership differentials (corporate or personal) were excluded from the study. This has cut out a great many titles wherein a considerable differential exists between the personal and corporate rates. The personal rates may not be publicised to institutions and vice versa. A recent example is a British serial where the '1982 annual subscription price is £315.00 net (UK only) . . .', which is at least ten times the individual or personal member rate. Such cases, however, are not in the same category as commercial 'discriminatory pricing'. The rate to individuals appears barely to cover replication, distribution and overheads. The Pergamon policy would seem comparable in the cheapness of its individual rate but not otherwise, since the latter only applies to copies additional to a full-rate subscription by a parent organisation.

3. Marcel Dekker describes individual subscriptions as a 'special discounted rate'.

   An Indian serial (*Journal of Scientific and Industrial Research*; CSIR) also describes the individual subscriptions as discounted from the institutional rate (50 per cent discount for research workers and students, and 25 per cent for other individuals).

4. Multiple-use subscribers are variously described in the sample studied as 'libraries', 'multiple-reader situations', 'institutions and libraries' and the like.

   As well as an institutional or library rate, one UK serial quotes a higher rate for government agencies and business firms, and specially low rates for developing countries.

5. A Basil Blackwell example (*Journal of Business Finance and Accounting*) offers subscriptions to 'institutions, libraries or professional' *or* 'teachers or students' with ratios varying around the mean. In US serials, special student rates are fairly common.

6. Some commercial journals offer special rates to members of societies concerned with the same or related subject areas. (This could be bound up not only with marketing but with the stimulation of contributions.)

7. A number of UK serials have special rates for the US, or for the US and Canada. One says 'America and Japan'. Some cases could well be due to the use of air mail, but the differential in other cases appears much higher than necessary for air mail alone, and there are occasionally higher prices for Canada than for the US. In all cases, dollar prices are quoted. In the many other UK serials which quote a dollar rate *without* mentioning the US or Canada, that rate applies to all overseas subscribers.

8. Warranties regarding personal use are required by some UK, US and Netherlands publishers, and the warranty sometimes requires that copies shall not be passed to a library until they are at least one year old. Other publishers (the majority in the sample) are content with a personal application and/or a personal cheque.

9. Copyright Clearance Center (CCC, in the US) notices and copying rates appear in a number of UK serials (that is, additionally to Pergamon, which mentions CCC as part of its common policy).

AFTERWORD

When this paper was in press, the Spring 1984 issue of the *Serials Librarian* included several important items on 'tier' or 'dual' pricing but believed the policy to be beneficial to libraries. However, this belief was based on a constructed publisher costing example, and real profit elements naturally remain obscured. There are references to two important American surveys: Wittig, G.R. in *College and Research Libraries*, September 1977; and Miller, Dick R., and Jensen, J.E. in *Bulletin of the Medical Library Association*, October 1980. Wittig quotes *Landscape Architecture* as having announced on page 258 of the 1969 volume that a separate institutional rate was 'made necessary by the xerographic revolution'. He shows that 'dual pricing' started in the mid-1950s and reached about 15 per cent of all titles sampled by the mid-1970s. Miller and Jensen comment that 'a substantial number of health-related journals that have dual pricing also require copying royalties'.

On page 108 of the above Spring issue, the ALA Policy and Research Committee is reported as about to compile 1982 data for the 180 titles in the Wittig study. The references in the issue, which themselves give further references, did not come out in a computer search due to terminological difficulties. This topic has clearly received more attention than was thought and further UK attention in greater depth would seem desirable from other researchers.

Letters to the Editor

From Harry East

I should like to make two amendments to my paper ('Special libraries and information services and the development of the UK information industry') published in the February issue of *Aslib Proceedings.*

The first is a typographical error in Fig. 8, 'UK production of published abstracts' where the 'per cent *Total abstracts published* (Government)' in 1977 should read '19.0' and *not* '9.0'.

The second is on p. 70, where I comment parenthetically: 'More recently the Commonwealth Agricultural Bureaux has succumbed to similar overtures.' The singularity of the organisation does not justify the misuse of the verb in the above comment. More seriously, it follows a statement about research organisations making sole marketing arrangements with commercial publishers. As worded, the comment is misleading and it would have been better if it had been deleted.

In fact, access to the CAB database is currently available through DIALOG, ESA, QUEST, and DIMDI, and there are no plans to offer access to CAB abstracts on an exclusive basis with any host. CAB has commissioned a commercial publisher to develop its new database management system but, I am assured, this implies neither a long-term commitment to the publisher nor any suggestion of exclusivity. I regret this misleading aside in my paper and apologise to CAB for having included it.

Harry East

Call for papers

INFORMATICS 8: Advanced Computational Techniques for Information Retrieval.

A conference jointly sponsored by Aslib, the Aslib Informatics Group, and the Information Retrieval Specialist Group of the British Computer Society, to be held 16/17/18 April 1985, in Wadham College, Oxford.

This conference will examine hardware and software methods for improving the efficiency and effectiveness of current retrieval systems. Topics to be discussed will include automatic text analysis, pattern recognition methods, intelligent front ends, natural language processing, retrieval algorithms and integration of IR systems with other types of computer system.

Key speakers have been invited to present review papers on developments and innovations in this area of computer science. A number of papers are also being sought relating to the topics mentioned above.

Those wishing to submit papers for consideration by the Selection Committee should send a title and an A4 page abstract to Sherry Jespersen, Manager, Professional Development Group, Aslib, The Association for Information Management, 3 Belgrave Square, London SW1X 8PL, not later than 28 September 1984.

Further details of the conference and a programme and registration form are available from the Conferences Secretary, Aslib.

TRANSLATING AND THE COMPUTER 6

Translation and Communication

A conference sponsored by
Aslib
The Aslib Technical Translation Group
The Translators' Guild

20–21 November 1984
The Waldorf Hotel, London W1

29 AUG 1984

This series of conferences is now recognised as the world's leading forum on machine translation.

The programme will include an overview of machine translation; a look at international telecommunications and voice recognition; discussion groups on current translation aids, machine translation and terminology; and a manufacturer's forum to display the latest equipment needed for the translator's office.

Translators, administrators and computer people in government, institutions and industry will all find this conference of value, as well as the information community as a whole. The accompanying exhibition will provide a lively commentary on the conference theme.

For further details contact: Sherry Jespersen, Manager, Professional Development Group, Aslib, 3 Belgrave Square, London SW1X 8PL. Tel: 01-235 5050. Telex: 23667.

Aslib

Proceedings

VOL. 36 NUMBER 9 SEPTEMBER 1984

ASLIB 17th ANNUAL LECTURE

Automating the synthesis of expert knowledge 337
Donald Michie

The electronic academy 345
Blaise Cronin

Letters to the Editor

Resource-sharing can work 367
Problems with computers at work 369

ASLIB PROCEEDINGS

Volume 36 **SEPTEMBER** **Number 9**

Aslib Proceedings carries papers given at Aslib meetings and conferences, and contributed papers of interest to practising professionals. These describe innovations in information management techniques, applications of existing information products and services, and case studies of information units and special libraries.

Aslib Proceedings is published monthly and supplied free to members of Aslib. Annual subscriptions to non-members: £50 (UK)/£60 (overseas); additional subscription to members: £30/£35. Single copy prices and subscription information are available from the Subscriptions Department, Aslib, The Association for Information Management, 3 Belgrave Square, London SW1X 8PL.

Manuscripts and editorial enquiries should be addressed to the Editor, *Aslib Proceedings,* 3 Belgrave Square, London SW1X 8PL. Manuscripts should be 1,000 to 3,000 words, typewritten, double-spaced, single-sided on A4 paper. Figures should be reproducible. An abstract of up to 200 words should be included. References should follow British Standard 5605:1978. Published authors will receive twenty-five free offprints of their article.

Advertising information is available from the Editor, as above. Further information about Aslib's services and membership rates will be supplied on application to the Director, Aslib, The Association for Information Management, 3 Belgrave Square, London SW1X 8PL. Telephone: (01) 235 5050; telex: 23667 (answer-back Aslib G).

© 1984 Aslib and contributors **ISSN 0001 253X**

Automating the synthesis of expert knowledge

Donald Michie
Turing Institute, Scotland

Paper presented as the Aslib 17th Annual Lecture, at the Royal Aeronautical Society, London, on 7 June 1984.

Automating the construction of machine-interpretable knowledge-bases is one of the immediate next moves in the emerging technology of information. Feasibility of computer induction of new knowledge from examples has been shown in more than one laboratory. Means are described for generating knowledge-based programs that are automatically guaranteed analysable and executable by machine and human brain alike.

Inductive learning

A number of computer programs have been developed which 'learn' by generating rules from examples, *i.e.* by induction (see Michalski and Chilausky[1]; Quinlan[2,3]; Shapiro and Niblett[4]; Paterson and Niblett[5]; and papers in Michalski, Carbonell and Mitchell[6]).

As a result of a long sustained interest in machine learning[7], our Edinburgh group has recently become a practised computer induction shop, along with I. Bratko's Artificial Intelligence division of the Josef Stefan Institute, Yugoslavia, R.S. Michalski's group in the University of Illinois, and J.R. Quinlan's laboratory in the New South Wales Institute for Science and Technology, Sydney. We can now routinely synthesise machine-executable descriptions (in the form of PASCAL, FORTRAN, PROLOG or C programs) for classification tasks too complex for human experts either to program, to verbalise complete strategies for, or even reliably to perform. According to the style adopted, the machine-generated descriptions can be made to take either 'Martian' or human form. In the second case, in spite of its synthetic origin, we call a machine-made description a concept-expression. A recently developed programming technique[8] has added the following capability: when a machine-made concept is 'run' on a trial case, the system not only classifies the case but also displays an explanatory narrative in intelligible English as to how it arrived at the classification—something that cannot always be done by the possessor of the equivalent human-made concept. This is a help both to the end-user and to the knowledge engineer.

Aslib Proceedings, **36** (9), September 1984, pp 337–343. Printed in Great Britain.

A brief description of methods and principles used by one of the Edinburgh learning programs, ACLS, is given below. The program is a development from Quinlan's ID3, in turn derived from Hunt, Marin and Stone's CLS (Concept Learning System)[9]. A commercially enhanced version of ACLS has also been described by R. Mclaren[10].

ACLS (Analog Concept Learning System)

A 'training set' of examples of classifications within a chosen field is presented to ACLS as a list of records. All fields of the record except the last are entered with the values of those attributes considered by the user to be relevant to the classification task. These are known as 'primitive attributes'. The last field is entered with the name of the decision class to which the record is to be assigned (*e.g.* CIRCLE, ELLIPSE, TRIANGLE, SQUARE, POLYGON, OTHER; or MALIGNANT, BENIGN, IMAGINARY; or ALLOWED, DISALLOWED, SPECIAL-CASE; or just TRUE, FALSE).

From these example records ACLS derives a classification rule in the form of a decision tree, branching according to values of the attributes situated at the nodes. ACLS also generates a PASCAL conditional expression logically equivalent to the decision tree, and this PASCAL code can be run to classify new test examples. Whenever a new example is found which refutes the current rule, ACLS can be asked to restructure the rule so as to accommodate the new case, and to display, store or output it as before.

The set of attributes should be chosen by an expert in the given problem domain to be sufficient for classifying the data. In choosing the set of attributes the maxim is: if in doubt, put it in. Any attribute which is in reality redundant will be set to one side by ACLS and not included in the tree (and corresponding PASCAL code) which it generates.

It is not necessary that the expert should be armed with a clear mental picture of the rule which he himself uses when performing the given task.

His role is simply to structure the problem into sub-problems, to supply the list of primitives and to act as an oracle by assigning example data to what he considers to be their correct classes. ACLS observes his behaviour as a classifier, and from this constructs the simplest rule it can, using the primitives supplied, which will assign the same example data to the same classes as he does. As the training set grows with the addition of fresh examples, so the ACLS-synthesised rule grows more sophisticated. As it does so it tends to approximate to a form on which the expert may comment: 'That looks like the way that I think I probably do it.'

The expert is thus enabled to transfer to the machine a judgemental rule which he already had in his head but had not explicitly formulated.

We list below four closely related questions under investigation with the aid of ACLS and similar programs:

1. the possibility that a learning program, such as the one described above, can be used to extend the mental grasp of the human user;
2. the use of the machine-synthesised programs as instructional texts;

3. numerical measurement of the knowledge (see later) contained in machine-synthesised programs;
4. development of human-intelligible concept description languages as mandatory vehicles for output from induction systems.

For a number of reasons, chess is specially qualified as a test domain for experiments of this kind. However, in order to confirm the generality of observed results, after basic work has been done in this measureable 'test-tube' world, ACLS-type programs can be used to investigate knowledge enhancement in the domain of school algebra, robot vision, industrial engineering, fault diagnosis, chemistry, etc. A general idea of how 'programming by examples' is done is given in a recent paper by Shapiro and Michie[8].

Knowledge measurement

Tests using an information theory approach to measure the knowledge-content of machine-produced (synthetic) programs are under way in Edinburgh[11,12] and Illinois[13]. Relevant theoretical work has also been conducted at Stanford[14].

Use is made of machine-oriented definitions, such as the 'knowledge-content' of a program, 'computational advantage', 'penetration', 'grasp', and rate of knowledge acquisition. 'Difficulty' of a problem can also be expressed within the same numerical calculus. The current objective is to build the measurement system referred to above into rule-synthesis programs. Induction programs will then be enabled not only to produce rules which can be executed by machine but at the same time will be able to give the user a quantitative evaluation of each rule as it is synthesised—in terms both of its information content and of its anticipated suitability as a human-usable concept. This style of proceeding can be exemplified from recent work of Shapiro[15]. Shapiro's synthetic rules combined a reasonable approximation to machine optimality with brain feasibility. No general guarantee can be given that the two goals can be combined in any particular case. Moreover, from the point of view of brain feasibility, the problem of program transparency has been found to have some surprising twists.

Super-programs

Recent results have shown that programs constructed by systems such as Quinlan's ID3 can be, in one sense, 'super-programs' and at the same time quite incomprehensible to people. By a super-program we mean one that is at least twice as efficient in terms of execution cost as the best which could be written by a programmer.

FIG. 1 shows the execution costs on a CDC Cyber 72 for three different programs written to solve the same difficult problem. The first implements a standard algorithmic approach. The second was the fastest pattern-coded solution which J.R. Quinlan, the author of ID3 and also an outstanding

Lost-3-ply experiments
(CDC Cyber 72 at Sydney University)

49 attributes
mixture of 35 pattern-based
4 low-level predicate
10 high-level predicates

715 distinct instances

177-node decision tree found in 34 seconds

Classification method	**CPU time (msec)**
Minimax search	285.0
Specialised search	17.5
Using decision tree	3.4

FIG. 1. *Upper part of Figure relates to the inductive synthesis of a recogniser for the 'lost 3-ply' property in the chess ending king and knight* v. *king and rook. Lower part compares run-time performance of two hand-made and one machine-synthesised recogniser (from Quinlan, 1982).*

programmer, could achieve after many months of work. About two months of these were expended on finding an adequate set of primitive descriptors for the problem. The third was a machine-generated program, produced by ID3 itself, equipped with the file of primitive descriptors and a complete file of example data. ID3 running on the Cyber 72 generated this decision-tree program in 34 seconds. The ID3-synthesised program clearly qualifies as a super-program (see FIG. 1). Further and perhaps alarmingly, however hard they try, chess experts cannot understand it. Even though it constitutes a complete and correct descripion, it does not quallify as a *concept description.*

Work triggered by this observation has shown the reason, which lies in the way the decision tree generated by ID3 (or the corresponding PASCAL expression) is structured. We have therefore developed a method known as 'structured induction'. This is a hierarchical approach in the sense that the rules, or concept-expressions, generated by the program using the original primitive attributes themselves become the primitives for the next pass through the data (see Shapiro and Niblett[4]). Shapiro subsequently applied the approach to the ending:

king and pawn *versus* king and rook (pawn on a7).

This work generated a complete and self-documenting classifier for a space of over 200,000 positions, using some 350 expert-supplied examples. Since human experts are unfortunately not self-documenting, no codified classification theory of the domain previously existed. The classifier thus constitutes an original if miniscule contribution to end-game theory.

The method described constrains the output of the inductive generator to take the form of decision structures which people can recognise as concepts. The constraints have been embodied in the syntax of a rule language CDL (Concept Description Language 1), for which a compiler is operational on the VAX-750. A new version, Human Subset Language (HSL), is under development which enables the user to define 'fuzzy' as well as strictly logical building blocks for his synthetic concept.

A knowledge refinery

Expert systems have commercial promise. A system of over 2,000 rules called R1 is used at Digital Equipment Corporation for configuring computer systems to customers needs (see McDermott[16]). It already outperforms their best technical salesmen. But in *knowledge refining and synthesis*, the focus is not on the product which expert systems were originally designed to deliver, namely interactive advice in conversation with a client, but on the unexpected by-product, the finished knowledge-base itself. Expert system languages and induction systems can be used:

to get knowledge into the machine;
to test it;
to debug it;
to fill gaps;
to extend it;
to modify it.

Finally the knowledge can be put back into the human world in *unrecognisably improved shape.* This important phenomenon was shown by Bratko to be generalisable across different knowledge domains using one and the same computer induction program. In the differential diagnosis of lymphatic cancers Bratko successfully used an Edinburgh learning program derived from Ross Quinlan's ID3 to generate an improved classificatory scheme for this category of malignant disease. The Edinburgh program had been developed by Shapiro and Niblett[4] using the domain of chess. Strategies for chess end-games were conveyed by examples. The resulting correct and complete theory of king and pawn against king is itself of interest to chess masters. Bratko then used the same program, in collaboration with clinical oncologists, to construct a diagnostic scheme for the lymphatic cancers. In this experiment, with help only in extracting data from medical case histories, Bratko was able to perform as if he were a clinical expert, although knowing nothing about medicine[17].

Requirements for a refinery

What are the necessary ingredients for knowledge refining?

1. Knowledge-engineering software able to make inferences from data supplied, and to retrace and display the lines of reasoning.

2. Induction modules able to generate rules from examples.
3. A good software development environment, *e.g.* UNIX or INTERLISP.
4. Trained knowledge engineers familiar with the above tools.
5. One or more experts. Even with inductive knowledge generation automated to the limit of current technique, an expert is still needed to choose the repertoire of primitive measurements or attributes to evaluate as relevant to the given problem domain, and to assist the knowledge engineer in the task of decomposing the domain into sub-problems, sub-sub-problems etc. This top-down analysis is the heart of the structured method of induction referred to earlier.

Originally designed to deliver interactive advice, it now appears that expert systems have a by-product which is in the long term more important—the finished knowledge-base itself. A concluding example may be useful, taken from a recent study by Mozetic, Bratko and Lavrac[18].

Using the logic programming language PROLOG, the authors collaborated with senior clinical cardiologists at the Ljubljana University Medical School. The Yugoslav group applied a generalisation of the 'easy inverse' method[19] to the machine construction of a complete and ultra-reliable diagnostic scheme for multiple arrhythmias and their relation to the ECG wave form. The new knowledge, although small in extent, is sufficient to have a use in teaching and as a reference text for the specialist.

Computers as co-authors

To recapitulate, expert systems can be used:

to get knowledge into the machine;
to test it;
to debug it;
to fill gaps;
to extend it;
to modify it;

and finally

to put the knowledge back into human hands in improved form.

Thus, the possibility now exists of superseding (as the automobile has superseded the horse) a craft which has been in existence for thousands of years—namely, the writing of manuals and texts on how to do things.

REFERENCES

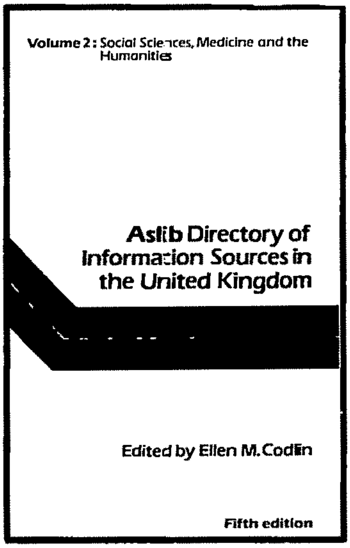
1. MICHALSKI, R.S., *and* CHILAUSKY, R.L. Knowledge acquisition by encoding expert rules *versus* computer induction from examples: a case study involving soybean pathology. *Int. J. for Man-Machine Studies*, **12**, (1980) 63–87.
2. QUINLAN, J.R. Discovering rules by induction from large collections of examples. In: *Expert systems in the microlectronic age* (ed. D. Michie), Edinburgh: Edinburgh University Press, 1979. pp. 33–46. See also Quinlan's chapter in Michalski, Carbonell and Mitchell, 1983)

3. QUINLAN, J.R. Semi-autonomous acquisitions of pattern-based knowledge. In: *Introductory readings in expert systems* (ed. D. Michie). New York, London and Paris: Gordon and Breach, 1982. pp. 192–207.
4. SHAPIRO, A. *and* NIBLETT, T.B. Automatic induction of classification rules for a chess end-game. *Advances in computer chess 3* (ed. M.R.B. Clarke). Oxford: Pergamon, 1982. pp. 73–92.
5. PATERSON, A. *and* NIBLETT, T.B. *ACLS manual.* Edinburgh, UK, and Champaign, USA: Intelligent Terminals Ltd, 1982.
6. MICHALSKI, R.S., CARBONELL, J. *and* MITCHELL, T. (eds.) *Machine learning: an artificial intelligence approach.* Palo Alto: Tioga, 1983.
7. MICHIE, D. Experiments on the mechanisation of game learning. 2 rule-based learning and the human window. *Computer Journal,* **25,** (1982). 105–113.
8. SHAPIRO, A. *and* MICHIE, D. A self-commenting facility for inductively synthesised end-game expertise. In *Advances in computer chess 4* (ed. D. Beal). Oxford: Pergamon, 1984.
9. HUNT, E.G., MARIN, J. *and* STONE, *Experiments in induction.* New York: Academic Press, 1966.
10. McLAREN, R. *Expert-Ease user manual.* Edinburgh: Export Software International Ltd, 1984.
11. MICHIE, D. A theory of advice. *Machine Intelligence 8* (eds. E.W. Elcock and D. Michie). Chichester: Horwood, and New York: Halsted Press, 1977. pp. 151–158.
12. MICHIE, D. Measuring the knowledge-content of expert programs. *Bulletin of the Institute of Mathematics and its Applications.* **18** (11/12), 1982. 216–220.
13. JACKSON, J.A. Economics of automatic generation of rules from examples in a chess end-game. M.Sc. thesis. Urbana: University of Illinois, 1975.
14. YAO, A. Theory and applications of trapdoor functions. *Proc. 23rd Annual Symposium on Foundations of Computer Science* (Chicago), Los Angeles: IEEE, 1982. pp. 80–91.
15. SHAPIRO, A. The role of structured induction in expert systems. Ph.D. thesis. Edinburgh: University of Edinburgh, 1983.
16. MCDERMOTT, J. XSEL: computer salesperson's assistant. *Machine Intelligence 10* (eds. J.E. Hayes, D. Michie and Y-H. Pao). Chichester: Horwood, and New York, Halsted Press, 1982. 325–337.
17. BRATKO, I. *and* MULEC, P. An experiment in automatic learning of diagnostic rules. *Informatica,* **4,** 1980. 18–25.
18. MOZETIC, I., BRATKO, I. *and* LAVRAC, N. An experiment in automatic synthesis of expert knowledge through modelling. *Proc. Logic Prog. Workshop.* Albufeira, Portugal. June 26–July 1, 1983.
19. MICHIE, D. Game-playing programs and the conceptual interface. In: *Computer game-playing* (ed. M. Bramer). Chichester: Horwood and New York: Halsted Press, 1982. pp. 11–25

Aslib Directory of Information Sources in the United Kingdom

Volume 2 : Social Sciences, Medicine and the Humanities

Edited by Ellen M. Codlin


Volume 2 : Social Sciences, Medicine and the Humanities

Aslib Directory of Information Sources in the United Kingdom

Edited by Ellen M. Codlin

Fifth edition

Fifth edition

Lists over 3500 organisations which are able to make information available on the social sciences, medicine and the humanities. Copious references identify bodies who have changed their names or become amalgamated with others; an index of abbreviations and acronyms is also provided.

254 × 160mm 1984 1000pp
ISBN 0–85142–184–9
UK £60; overseas £70
£10 discount for Aslib members

From 28 September 1984, our new address will be
26/27 Boswell Street, London WC1

The electronic academy

Blaise Cronin
Aslib Research & Consultancy

This article is based on a study commissioned by the British Library Research & Development Department to consider the feasibility of setting up a national distance learning scheme for information and library studies in the United Kingdom. It reviews recent developments internationally in the field of distance learning and provides an assessment of the enabling technologies. A number of models for future action are proposed.

Introduction

In recent years there has been considerable, if somewhat belated, speculation as to the ways in which developments in computing and communications technologies will affect educational structures, institutions, programmes and delivery systems. Although the predictions differ, as is inevitable, there is wide agreement that radical transformation is imminent. As we move from an industrial to a post-industrial society, the decline of traditional manufacturing and extractive industries is being counterpointed by the growth of the so-called knowledge industries. This shift in economic emphasis can be seen most clearly by looking at changes in occupational ratios over the past few decades. In developed nations a rapidly increasing proportion of the labour force is engaged in information-related activities: according to Porat[1], more than 50 per cent of the US work force consists of information workers of one kind or another.

In future, a country's prosperity may depend significantly on its ability to create new knowledge and to innovate technologically. In order to retain its competitive edge in the international market-place, a country will have to develop and maintain a highly skilled and adaptable work force, which in turn will depend on its ability to provide flexible and responsive education and training. As the concept of a single, lifelong career is replaced by that of the serial career, individuals will have to accept the necessity of continuous reskilling and the inevitability of career track switching.

Conventional education systems are institutionally defined and 'based on a passive, dependent student role'[2]. They inherently lack the flexibility which will be needed if customised post-experience training is to be provided on a national basis. One of the barriers to 'opening up' education and creating genuine equality of opportunity is, the inertia of the existing institutional framework. Nevertheless, within the tertiary education sector there are signs that deconstruction and de-institutionalisation are under way, but this is a

Aslib Proceedings, **36** (9), September 1984, pp.345–366. Printed in Great Britain.

gradual process and short-term economic considerations still seem to outweigh long-term social considerations in educational planning.

Educational policy-makers are not constrained solely by financial considerations and institutional inertia; they are also faced with the task of planning for a situation without real precedent. To quote Higgin: 'In a placid environment the nature and behaviour of external bodies and forces can be sufficiently known and predictable to allow forecasting and planning. In a turbulent environment these factors are no longer predictable, either in their relationship to each other or in their relationship to any organization'[3]. He goes on to argue that a prerequisite of developing adaptive strategies and overcoming what Maddison refers to as 'academic insouciance'[4] is a clear collective recognition within the educational world that the situation is changing and that this will necessitate sustained contingency planning.

Although a variety of more or less plausible scenarios can be suggested, some trends are already discernible and others seem likely. In proposing a 'new educational model', Dede foresees, amongst others, the following changes:

> differentiation of education and training with education being done by people and training by machines;
> decentralisation of the learning environment into homes, communities and industries;
> decredentialisation and informalisation of the educational experience;
> privatisation of the educational enterprise;
> new administrative networks; and
> new machine-coupled teaching strategies.

To a greater or lesser extent there is evidence that each of these changes has already begun. This paper will consider the ways in which such changes might affect education and training for careers in information and library work, with particular emphasis on the potential for distance learning schemes.

Open learning systems

Open learning systems (OLS) is a generic term to describe structures or arrangements which remove some of the constraints on time, place and pace of study by offering students a degree of flexibility in defining programmes of study and in the pursuit of those programmes. Open learning systems are an attempt to meet the needs of the educational consumer on his or her own terms, by, to some extent, uncoupling the instructional process from the host institution, by giving the student a greater measure of self-determination, and by playing down credentialism. Open learning schemes fall into three broad categories[6]:

(1) College-based systems in which the teaching is carried out at the sponsoring institution, but in which the student is given the opportunity to study at his or her own speed. Flexistudy courses are a common and increasingly popular form of college-based open learning schemes.

(2) Local systems attract students from the catchment area of a local college or institution, but permit the student to study part of the time at home. The institution's role is to make available appropriate learning materials, tutorial support and communal resources.

(3) Distance learning schemes are those in which the student is physically remote from the host institution. In this type of arrangement the student works independently at a distance, typically relying on correspondence materials (which can, of course, be multi-media in character) or, increasingly, by using interactive facilities (e.g. teleconferencing) to overcome the 'tyranny' of distance. However, most distance learning schemes still place great importance on the value of face-to-face contact between students and tutors, and students and their peers.

Two points need to be made at the outset: (a) the categorisation above is by no means inflexible and disguises a variety of modalities; (b) a distance learning scheme may not be 'open' in the true sense of the word, while an open learning scheme does not imply that the student is remote from the college or institution. In due course there may be a blurring of distinctions as comprehensive systems are established which 'embrace college, local and distant open learning systems as well as conventional teaching methods'[7].

Distance learning schemes

The literature on distance learning is voluminous and growing. Within this literature there is considerable variety and inconsistency in the terminology used. According to Holmberg[8], 'the overall characteristic of distance education is that it is based on non-contiguous communication'. Expanding on this, Moore[9] defines distance education as:

> 'the family of instructional methods in which the teaching behaviours are executed apart from the learning behaviours, including those that in a contiguous situation would be performed in the learner's presence, so that the communication between the teacher and the learner must be facilitated by print, electronic, mechanical or other devices.'

In his review of existing definitions and theories, Keegan concludes that any comprehensive definition of distance education must take account of the following six dimensions[10]:

separation of teacher and student;
influence of an educational organisation, especially in the planning and preparation of learning materials;
use of technical media;
provision of two-way communication;
possibility of occasional seminars;
participation in the most industrialised form of education.

Distance education is, as Keegan notes, a generic term 'that includes the range of teaching/learning strategies referred to as "correspondence education/study" at the further education level in the United Kingdom; "home study" at the further education level and "independent study" at the higher education level in the United States; "external studies" at all levels in Australia; and "distance teaching" or "teaching at a distance" by the Open University of the United Kingdom"[11].

The concept is by no means novel: it has been around in various forms and guises for many years. However, it is still the case that the great majority of distance learning schemes are based on print-on-paper materials, and make relatively little use of educational technology. Nor is it the case that all distance education schemes are open, flexible, modular, or mixed mode in character, though the trend is in this direction. Examples of hosts offering innovative and successful open learning schemes are the Open University in the UK, and the universities of Athabasca and Wisconsin in the USA, each of which is committed to the development of new and improved two-way communication channels between students and the sponsoring institution.

At its most basic, distance education differs from traditional campus-based education only in so far as it offers students the opportunity of studying some or all of the courses offered by the sponsoring institution off-site. However, technology is providing educators with an opportunity to enrich their off-site offerings, both in terms of the content of courses and the degree of interactivity they afford.

The different forms of distance education are distinguished by the media or communication technologies used to deliver the courses. The four principal categories are:

(1) Print-based materials (books, journal articles, specially prepared reading packs, self-assessment packs, reading lists and notes designed to accompany radio, TV or satellite broadcasts);

(2) Audio-based materials (audio cassettes, courses by radio);

(3) Video-based materials (video tapes; interactive video, TV and satellite broadcasts; slow-scan TV; talkback TV);

(4) Computer-based materials (interactive computing; computer-assisted learning programs; computer conferencing).

Recent developments in information technology have greatly extended the scope for participation in distance education by improving the variety, character and interactivity of the learning materials and channels used, and by enabling students and tutors to communicate more frequently and more easily on a person-to-person basis from remote locations. These developments remove some of the barriers to educational uptake, and thus expand the market for post-experience training and lifelong education.

Although developments in educational technology are creating new opportunities and challenges (for educators and students alike) the design of distance learning schemes requires fresh approaches to educational administration, teaching strategies, and curriculum design and evaluation. Distance education schemes based solely on print-on-paper materials are in effect a direct analogue of conventionally taught courses, with the exception of the face-to-face component. As such they are relatively simple to design and administer. However, the greater the variety of educational media employed in the delivery of a course or programme, the greater the need for new outlooks and approaches to resources management and pedagogy. According to Erdos, any formalised distance education scheme has a recognisable structure of interacting sub-systems[12]:

> the educational programme (as defined in terms of institutional aims and course goals);
> management (which includes the practical aspects of student record keeping; communication and overall programme administration);
> student services (information and advice to students and prospective students; counselling; admissions and examination information);
> teaching materials (planning; design and production of course materials);
> finance (budgeting; revenue; accounting; expenditure; costing);
> evaluation (assessment of programmes in relation to stated objectives; research; updating and improvement of courses and course materials).

To this list should perhaps be added a sub-system dealing with the development of appropriate attitudes, teaching styles and new capabilities among faculty. Clearly, any institution seriously interested in launching and developing distance learning programmes has to give considerable thought to each of these sub-systems and the ways in which they interact.

Current developments in the UK

Perhaps the single most influential development in the field of continuing education during the last few decades has been the establishment in the UK of the Open University (OU). The esteem in which the OU is held internationally derives from a number of factors: its concern for academic standards, its commitment to developing and applying the latest instructional technology, and its obvious concern for the educational and pastoral needs of its students[13]. In recent years the OU has considerably expanded its Continuing Education programme, thereby enabling students to study single courses or modules. This is a direct response to the growing demand nationally for flexible and accessible post-experience training, and has been made possible by the skills already developed by OU staff (educationalists and technologists) and the university's well-established network of regional tutors.

The present UK government is strongly committed to the provision of more and better post-experience training provision, particularly in relation to information technology[14]. However, with limited growth in public expenditure on higher education, academic institutions are under pressure to devise new and imaginative approaches to resource attraction and allocation. Although the Government's desire to improve the quality and range of continuing and adult education is real, the Department of Education and Science (DES) remains insistent that the extra financial burden this entails should not be borne by the public purse, and is thus encouraging closer collaboration between academia and industry in the development of training programmes and materials. In future, it is likely that private sector finance will be an important factor in the launching of new training initiatives.

Modelled loosely on the Open University, the Open Tech scheme was inaugurated in 1983 to provide individualised training programmes for industry. The Open Tech programme comprises a multi-million pound budget for the development of 'open learning across the whole spectrum of technician, supervisory and management levels of skills and knowledge'[15]. Projects have already been initiated in the areas of computer-aided engineering, materials handling, energy conservation and stock control. Future projects will apparently include the business applications of information technology, and library and information science.

Another Government-inspired scheme (PICKUP), aimed at the professional workforce, was launched in 1982. PICKUP stands for professional, industrial and commercial updating, and is designed for people already in work, but whose work may be undergoing restructuring or reorganisation, or whose skills base may be in need of updating. The aim of the scheme is to improve the currency and level of professional skills nationally, and to make British industry more competitive. In line with current thinking, the Government is keen that industry and academia should collaborate in devising tailor-made training packages for specific target groups. Employers, for their part, will have to be prepared to pay an economic rate for the resultant educational products.

Two areas for which large-scale training provision is currently being provided are information technology and management studies. In 1982 the Government announced intended expenditure of £100m on information technology training in the tertiary education sector, with the aim of establishing new conversion and specialist courses in the field of information technology, along with new vocationally-orientated degree and diploma programmes in such subjects as data communication and networks, computer hardware and microcomputer interfacing, software engineering, man-machine interaction and database creation. Other Government schemes were designed to improve information technology awareness and skills in schools (the Microelectronics Education Programme) and to offer training in microelectronics to practising engineers and technicians (the Microelectronic Applications Programme). Another recent development has been the setting up of the Information Technology Centres (ITeCs) network to provide practical experience and training for unemployed young people.

In the field of management studies two recent developments deserve mention: the launch of the OU's Open Business School and Henley College's Open Management Education Programme. It is worth considering briefly the rationale of and background to the Open Business School, as this will illustrate just what can be achieved by careful planning. In the past the opportunity for thorough and comprehensive continuing management education was restricted to a small minority of the potential market interested in mid-career training[16]. The Open Business School is designed to make post-experience training available and affordable to all middle- and entry-level managers who might be interested in developing their professional skills and knowledge.

The aim is to develop several courses which, though self-standing, are designed to interlock in such a way as to provide the student with the opportunity of acquiring formal academic qualifications. The first four courses to be offered are: (1) 'The effective manager'; (2) 'Personnel selection and interviewing'; (3) 'Accounting and finance for managers'; (4) 'International marketing'. Further courses are planned. Each course is designed in such a way as to facilitate independent study at a distance. Students are therefore free to study at their own pace, using specially prepared work books, television and video programmes, and audio cassettes. Each student is allocated a personal tutor and most courses have a residential component to enable the student to put into practice the skills he or she has been learning.

The Open Business School was established with the backing of the British Institute of Management (BIM) and the financial support of the Foundation for Education Management (£100,000). Design work was begun only after the completion of a feasibility study funded by the Manpower Services Commission (MSC) to: (1) ascertain the likely level of uptake; and (2) identify likely sources of pump-priming capital. The course materials are being produced on an at-cost basis by specialists within the Open University.

The enabling technologies

Before considering the prospects for distance learning in relation to information and library studies, it may be useful to review some of the enabling technologies and the ways in which they can be utilised. Among educationalists there is a growing conviction that 'in the midst of technological innovation . . . exciting electronic developments need to be tapped in the drive towards lifelong learning' in order to produce 'a creative interchange between professional development and technological delivery systems'[17]. There is still in many countries a gulf between what is possible and what has been achieved, but there is good reason to believe that the adoption of the new technologies will accelerate in the years ahead.

One of the more ambitious and optimistic proposals is that of Tele-Learning Inc in the US which aims to become the largest private educational institution in the world by selling its courses to personal computer owners, either in the form of floppy disks or online from the company's mainframe computer. Whether Tele-Learning is right in thinking that an expanding domestic computer market coupled with growing interest generally in professional self-development and continuing education will make this a realistic possibility remains to be seen[18].

The ideal distance learning scheme should strive to offer students the maximum possible variety in teaching methods, tutorial support and peer group interaction, as well as flexibility in defining and directing their courses of study. Developments in educational technology over the past decade have made this a progressively more realisable goal.

Sharples has identified six desiderata of distance learning schemes, and the technologies which facilitate their attainment[19].

(1) *Interaction:* video discs; interactive databases and computer languages; PRESTEL.

(2) *Match medium to message:* CYCLOPS; cable TV; videotext; satellite TV.

(3) *Reduce duplication:* structured computer databases; computer networks.

(4) *Direct communication:* paging systems; automatic telephone exchanges; electronic mail.

(5) *Information production:* computer-aided graphic design systems (e.g. CYCLOPS studio); computer-based text layout systems; computer animation.

(6) *User-friendly devices:* personal computers; CYCLOPS.

Television

One of the best illustrations of how television can be used in a distance learning context is provided by the Open University, which over the years has developed a uniquely successful partnership with the BBC in broadcasting OU-produced TV programmes[20]. Another is TV Ontario in Canada which broadcasts in both French and English sixteen hours a day, seven days per week[21]. In discussing the characteristics and implications of television from the perspective of distance learning, Bates[22] makes an important distinction between recorded and broadcast TV in terms of their control characteristics and learner considerations. The limitation of broadcast TV is the inflexibility of the medium: the viewer does not have the opportunity to back-track, restructure or analyse in real time. Recorded TV, on the other hand, allows the viewer to stop and start the programme as desired. The great attraction of television as an educational medium is that it allows for distance-independent mass delivery of tailor-made programmes. There is, in addition, some evidence to suggest that TV may also positively affect the development of certain cognitive skills[23]. From a cost-efficiency point of view, television eliminates duplication of teacher effort and thus makes it possible to release staff for other functions.

Cable TV is a fast-growing medium which has tremendous potential (it is estimated that there are more that twenty million subscriber households in the US[24]). In the UK the first franchises have just been granted to a number of cable TV consortia. Cable TV both increases the number of broadcasting channels potentially available to educators and at the same time permits narrowcasting, i.e. the targeting of tailor-made programmes at specific target or minority interest groups. The QUBE interactive TV cable system in Colombus, Ohio, allows citizenry to take post-secondary courses offered by local educational institutes, while in Japan the Hi-OVIS optical-fibre-based system has been designed to, amongst other things, provide increased opportunities for lifelong education[25]. A feature of the Hi-OVIS system is that particular programmes can be requested and broadcast on-demand to individual subscribers.

Other developments of interest include talk-back television which combines one-way broadcasts with telephone hook-ups to enable students to converse with their instructors. The Extension Division of the University of Victoria in British Columbia is one of several educational centres which provides interactive TV programmes through the Knowledge Network of the West Communication Authority[26]. In the Dallas/Fort Worth area of Texas, the TAGER system provides an interactive closed-circuit television network to post-secondary institutions and industrial concerns[27]. Another closed-circuit educational television network is the so-called '33,000 Square Mile Campus' in north-eastern California, which comprises thirteen remote sites[28].

Slow-scan television is a technique which uses inexpensive audio channels (e.g. telephone lines) to transmit visual information. The Toronto Telemedicine Project uses this technique to improve the quality and efficiency of health care delivery to rural populations, by, for example, sending X-rays down the line so that centralised, specialist expertise is made available to health care workers at remote locations[29].

Videotex

Another technology to be considered is videotex. In a distance learning context, videotex could be used to: (1) transmit general or specific information about courses, events and the host institution itself; (2) deliver course materials; (3) provide two-way interaction between students and teachers; and (4) enable learners to access remote databases through gateways. Unlike radio, television or the telephone, videotex-carried information is not time-dependent. The learner can scan the information held in the system at the time of his or her choice. The University of Manitoba is currently an information provider (IP) on Telidon, the Canadian public viewdata system, and has been evaluating the system as a means of disseminating information on courses, registration procedures and related subjects. The results of the early trials have been encouraging, and the University predicts a bright future for videotex, once the technology has stabilised and transmission costs have fallen[30].

Teleconferencing

Teleconferencing is a generic term. There are in fact four principal modes of teleconferencing: computer conferencing; audio teleconferencing; audiographics; and video teleconferencing[31]. Of the four, computer conferencing is the only one not to have the voice-communication component. Any electronic information exchange network can be classed as computer conferencing. The difference between computer conferencing and other forms of teleconferencing is that for the former participants are not required to communicate in real time. With computer conferencing it is quite feasible for users to dip in and out of the proceedings: a computer conference is not time-restricted and ideas can be pooled and exchanged over an indeterminate period—as long, in fact, as the participants remain interested. Telecom Gold and Micronet 800 are examples of public computer-conferencing facilities; ESA-IRS is a private system, and BLEND (the BLRDD-funded system) an example of a closed user-group network.

Audio teleconferencing permits voice-only communication by linking participants in remote locations via ordinary telephone lines. Broadly speaking there are two options: (1) a dedicated network in which locations are connected via leased lines; and (2) dial-up teleconferencing which uses the public switched network. The great attraction of audio teleconferencing is that it utilises a familiar and widely-established technology—the telephone. Another important consideration is cost: audio teleconferencing is considerably cheaper than videoconferencing and thus likely to be more attractive to the education community.

Audiographics uses the ordinary telephone line to transmit information other than speech. This allows the voice element to be enriched with written, printed or graphic material during the course of a conference. A number of techniques are available; for example, the Electronic Blackboard which can be used to send handwriting or hand-drawn graphics over the phone line to remote locations where the images are presented on a conventional TV screen. Alternatively, a light-pen system or facsimile machine could be used.

Unlike the three approaches just outlined, videoconferencing offers images of the participants, and thus provides a richer, more natural social context. Although videoconferencing is often taken to mean full-motion, real-time image display, there are a number of cheaper, though technically inferior options, such as freeze-frame and compressed video.

Of the four approaches, the most widely used is audio teleconferencing, and the least (not surprising in view of the associated costs) is full-motion audio/video conferencing.

Teleconferencing has been around for a long time. Both Ohio State University and the University of Wisconsin-Extension have been using teleconferencing for continuing education purposes since the mid-1960s. Many early applications were in the medical and health care fields. In higher education, teleconferencing has mainly been used to provide continuing professional education. Teleconferencing can be justified in cost-benefit terms when the target population is geographically scattered and access to institutional study centres difficult. Not surprisingly, countries such as Australia, Canada and the US have given the lead to other nations. In the US teleconferencing is growing annually at a rate of 20 per cent, and 35 per cent of applications overall are in the field of education[32].

In the UK, where distance is not really a major inhibitor to educational take-up, teleconferencing has been relatively slow to get off the ground. A pilot project is, however, under way at Plymouth (funded jointly by the Polytechnic, the Council for Educational Technology, the Open Tech and British Telecom) to assess the value of teleconferencing as a teaching and management tool in the context of a distance learning scheme. As a general rule, cost considerations are likely to constrain the use made of teleconferencing in the tertiary education sector. This is likely to be the case for the foreseeable future, particularly as regards videoconferencing. The most likely, development in the UK is that audioconferencing will be used, where appropriate and possible, with audiographics being transmitted via the OU-produced CYCLOPS system[33].

Computer-based learning systems

It has been noted that broadcast television denies the learner control. Programmes are broadcast at fixed schedules, aimed at the 'modal' learner, and essentially holistic in character. Recent developments in computer-assisted learning (CAL) make it possible to provide the student with greater control over the learning process. This is not the only advantage of computer-based learning systems. They can also bring about savings by cutting down on fixed cost expenditure (teachers' salaries, classroom facilities, etc.) and by reducing the time spent travelling by students. From the learner's point of view, systems such as PLATO or Wicat allow the individual to control the pace and content of the learning process from his or her own terminal. In theory, computer-based learning systems increase educational flexibility, eliminate duplication of effort, cut down on overheads and increase learner motivation. Systems such as these also enable teachers to write the content of their programmes and to define in advance the interactions to take place. This has been made possible by the development of authoring languages—software which allows the teacher to program the system to meet the needs of individual learners (or groups of learners) without the need for any programming expertise on the teacher's part.

Interactive video

Recent developments in interactive video will greatly increase the attractiveness of computer-based education. Interactive video brings together two technologies—optical video disc systems and microcomputers. According to Parsloe: 'Interactivity means that the user controls the programme. Interactive video's near relation is, arguably, the book. In both, it is easy to retrieve information quickly and directly; in both, the user sets the pace, skimming through familiar material and pausing to review new or difficult ideas'[34].

Interactive video disc systems allow for the combination of different types of materials in a single retrieval system—print, graphics and moving film. A video disc can typically store 54,000 frames of information (a frame being equivalent to an A4 page). These frames can be randomly accessed at high speed, and the user has the option of forward or reverse motion, plus a freeze-frame facility. Additional information can be built into the system by linking the video disc to a videotex system.

Interactive video is proving to be a popular and cost-effective training tool. Smith, Kline & French, for example, has developed a suite of programs to update medical practitioners in new medical techniques, and British Leyland Systems has developed video disc applications in such areas as marketing, training, dealer education and the archival storage of drawings[35]. Video disc is particularly suited to multi-media storage, and the Public Archives of Canada has developed a prototype system for the storage of prints, maps, motion pictures, posters and letters[36]. One of the best examples of video disc capability is the American Heart Association's video disc-based course on life-saving cardiopulmonary resuscitation. This system involves a video disc, a microcomputer (which both generates text and graphics, and monitors the student's performance) and a life-size inflatable dummy, designed and wired to respond realistically to the student's instructions. From an educational viewpoint, video disc technology offers flexibility, interactivity and simulation capability which greatly surpasses that of first-generation computer-based learning systems.

However, the associated costs are usually so great that few educational institutions are able to develop such systems on a 'go-it-alone' basis. Collaborative research and development will clearly be called for—ideally in the form of industry/academia co-operation. In his state-of-the-art review of interactive video disc technology and its potential for education and training, Duke concluded that: 'The scale and range of resources necessary to make any real progress is such that special funding arrangements are imperative, at least during the initial exploratory and developmental stages. It is natural to look to government, or government agencies, in the first instance to provide financial support. The question is to what extent could such support arguably be justified, and whether the traditional mechanisms of public funding of technological development projects are appropriate in this instance'[37].

Satellite communication

Information (voice messages, data, graphics, still and moving images) can be transmitted terrestrially or via satellite links. Today, point-to-point communication is frequently provided without conductive links. Satellite communication has much to recommend it (not least distance-independent tariffs), provided high data rates and remote locations are involved[38].

In reviewing the implications and potential of satellite conmmunication for library and information work, Hiller[29] argued that most library operations (e.g. information retrieval from external databases, co-operative cataloguing, document delivery) did not require (in terms of cost-effectiveness) satellite-based transmission systems. The only area for which cost justification could be produced was training-related teleconferencing where the participants were geographically scattered.

In North America an estimated 200–300 colleges and universities are offering their courses through public broadcast stations linked to a satellite, and an increasing proportion of these are experimenting with satellite-based teleconferencing[40]. In Canada, where a fairly small population is dispersed over a large land mass, the use of satellites in the delivery of adult and continuing education programmes is well established, not just to broadcast fixed schedule course-related material but to provide one-way video and two-way audio link-ups between the studio and remote groups of users.

Summary

Technology is constantly changing and improving. By linking or interfacing different technologies it is possible to design progressively more user-friendly systems which offer a high degree of interactivity. Comparatively speaking, the UK is less advanced than, say North America, in the application of the new technology to education and training, but the UK government's concern to improve national training provision for those areas most affected by information technology, and industry's growing willingness to take on some of the development costs, should in theory create the conditions necessary to foster new initiatives.

Financial considerations

Three types of benefits need to be considered in assessing distance learning schemes: social, pedagogic and economic. It is widely accepted that distance learning produces real social benefits. Education is made available to a larger market, and the net effect of this is to improve the overall level of technical and professional skills. As far as the pedagogic benefits are concerned, the application of new technology gives the student greater autonomy in what is studied and when, and to some extent may improve learner motivation. Whether there is any appreciable improvement in the quality of what is learned remains largely a matter of conjecture.

In any consideration of the economic benefits, it is important to go beyond simple cost comparisons with traditional systems, and to take account of the added social value of opening up education to a wider and more heterogeneous audience. The available evidence does not suggest that there are vast savings to be made by shifting the emphasis from conventional to non-traditional modes of delivery. To some degree, as Munshi notes[41], the expenses incurred in mounting a distance learning scheme are not all that different from those associated with more traditional systems. The major additional expenses are likely to be in producing tailor-made software, equipment and publicity materials. However, to quote Munshi: 'once a breakeven point is reached, the incremental cost to an institution for each additional student is relatively low. Therefore, most of the income generated by that student is "gravy". This is a rule that should apply to most distance learning systems using technology rather than extensive faculty-student interaction. The initial risks may be high but, once past the breakeven point, the returns climb much more quickly than for more traditional forms of education'[42]. The general picture therefore is one of high start-up costs coupled with large marginal income per student enrolled.

The design of course materials for use in a distance education scheme is a labour-intensive and costly undertaking. The experience of the Open University Open Business School, referred to earlier, illustrates the sort of capital and recurrent costs likely to be incurred for even a relatively modest undertaking. In North America there is a rule of thumb that one hour's teaching materials will require ten hours of teacher-time. Since materials have to be validated, piloted and supplemented with other materials and illustrations, the real ratio is likely to be closer to forty-to-one[43]. On the basis of these figures it has been estimated that a 'typical' course would cost around £30,000 to produce. To keep such a course up to date would add to the total expense. Assuming a life span of five years for a course package comprising 75 student-hours, then the maintenance cost would be in the region of £15,000[44]. These figures, it should be said, do not take into account the extra costs which would be incurred if high technology delivery systems were involved (e.g. providing hardware for both the institution and students).

In any large distance learning system, such as the Open University, considerable expenditure will be required to administer and manage courses and students. The OU has approximately 60,000 students scattered throughout the country. To ensure satisfactory levels of contact and support for the individual learner, the OU has a network of more than 2,000 part-time tutor-counsellors based at its 250 study centres, working alongside a further 4,000 course-based part-time tutors[45]. Devolution of this kind in a national scheme is essential if the host institution is to be able to respond flexibly and humanistically to the needs of the individual learner. With a distributed student body numbering 60,000 there is a very real need for effective management information, and over the years the OU has created a general data management and file processing system which allows it to assist selectively and efficiently in the work of its tutor-counsellors. The larger the student body, the greater the geographic scatter, the broader the portfolio of courses on offer, the greater therefore is the need for effective in-house administration and planning control. In any notional costing for a national scheme, care should be given to allocating costs to the development and maintenance of the administrative infrastructure.

Teaching information and library studies at a distance

The terms 'distance education', 'correspondence education' and 'external study' are often used interchangeably. The terms correspondence and external study are however commonly associated with print-based teaching materials. In using the term distance learning some degree of multimodality and interactivity is implied.

In Australia there is a long tradition of teaching librarianship by external study, at both the technician and professional (undergraduate and postgraduate) levels[46]. In the UK, Newcastle Polytechnic School of Librarianship and Information Studies recently developed (with the aid of a grant from PICKUP) a distance learning course 'Statistics for libraries: presentation of data', but this course does not make use of the new communication technologies. A technician-level qualification in library and information science is offered by Telford College of Further Education in Scotland, but this too is fairly traditionalist in character.

In Australia, Brisbane College of Advanced Education offers a series of interactive teleconferencing sessions via satellite to teacher-librarians to enable them to keep abreast of developments in education and school librarianship. The interactive element is normally preceded by a session based on a predistributed audiotape and supplemented by specially prepared written materials.

In the US, the University of Wisconsin-Extension offers continuing education courses via the Educational Telephone Network (ETN) which links 200 sites throughout the state. Since 1982 the University has added freeze-frame technology making it the world's largest videoconferencing network of interconnected permanent sites. Courses, such as the basic library-management course for public service librarians, include more than a dozen two-hour sessions via the ETN.

Perhaps the most innovative and ambitious attempt to provide a technology-delivered continuing education programme in information and library work is the Doctor of Arts in Information Science (DAIS) offered by Nova University (a private institution) in Florida. The DAIS is designed for field professionals who have a Master's degree in librarianship or information science (or a cognate subject) and who have had at least two years' practical work experience. The programme is structured in such a way as to enable students to complete the degree working independently and from a distance.

The five courses comprising the core curriculum are completed through a computer-based system. Tuition fees include up to forty hours free connect-time on the Nova host computer plus the costs of a computer terminal and modem (students who successfully complete the programme are entitled to keep the hardware). The Nova system is one of the best examples of an electronic academy. Messages, information updates, performance data and work assignments are stored and delivered electronically. All student assignments are written online, and the Unix operating system provides students with an authoring system (LEARN) which allows them to maintain extensive control over their own learning by enabling them to use all the Unix utilities while they are in any given lesson. These facilities are backed up by regional audioconferencing facilities. Much student work is done on resident database management systems that run under the Unix operating system. Other features of the Nova programme include online quiz sessions and seminars. Students, additionally, can at any time review their own master records held on the University's administration database.

The DAIS programme is heavily orientated to information management/information technology. Topics covered include computer operating systems, data structures, text editors, microcomputer hardware, applications programs, data communication, inferential statistics, modelling. electronic mail, networking, videotex, information retrieval, systems analysis, and much more besides. In many respects the Nova degree programme is a successful attempt to combine the teaching of information technology with practical exposure to the featured technologies.

The Nova approach suggests a model for the future. In the absence of information on costs involved in setting up the programme, it may safely be assumed that the initial expenditure was not inconsiderable. For this reason it may be difficult for public sector institutions (especially in the UK) to emulate the Nova approach, but it could nonetheless serve as a blueprint for future initiatives.

The UK: models for consideration

This paper has focussed on the technologies that enable continuing education to be delivered at a distance. The barriers to progress have less to do with the limitations of existing technologies or learner resistance to computer-based education systems than with the costs associated with creating new course materials and establishing new communication networks and channels. A recent report by the Educational Research Institute of British Columbia concluded that: 'The concepts of learning and communication are intertwined. With advances in communication and computer technology, the opportunities for lifelong education and learning at a distance are improving as the technology can free the individual to overcome the barriers of distance and restrictions of time schedules in order to engage in self-directed studies at the place, time and rate of learning determined by the individual[47].

True though this may be, the present situation in the UK, at least as far as information and library studies are concerned, does not favour the setting up of knowledge networks of the kind envisaged by Lundin[48]. Much of the pioneering work in distance education has taken place in Australia, Canada and the United States, and there is every reason to believe that these countries will continue to set trends for others to follow.

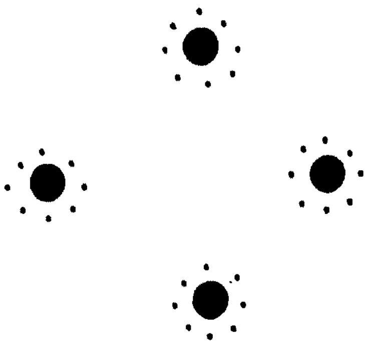


FIG. 1. *Individual LIS schools offer single or multiple courses (decentralised, non-co-ordinated provision)*

The present situation in the UK is characterised by fragmentation (FIG. 1). Continuing education for librarianship and information science is provided on an *ad hoc* basis. Each library school can, if it so chooses, offer updating courses. Decentralised provision of this kind is necessarily uneven and arguably not in the best interests of the professional community as a whole.

Alternative approaches can, of course, be suggested, but there is no necessary reason to assume that they will be tried or implemented. One alternative to the present pattern of localised provision would be to set up a decentralised network of course providers (FIG. 2) to share costs, work effort and coverage. In such a scheme, Institution A would offer courses in field *x* to a national audience; Institution B courses in field *y*, and so on. The net effect would be to eliminate duplication of effort, reduce unit production costs and attract a larger market. Of course, there would still be the question of how to deliver courses, which communication technologies to use and how to raise the necessary pump-priming capital for new developments.

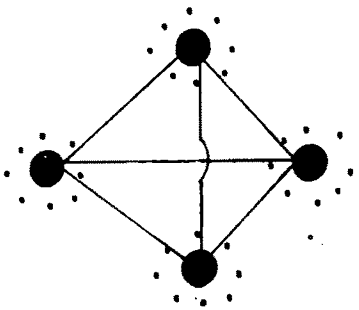


FIG. 2. *LIS schools set up a decentralised network with co-ordinated offerings (each school creating some course materials)*

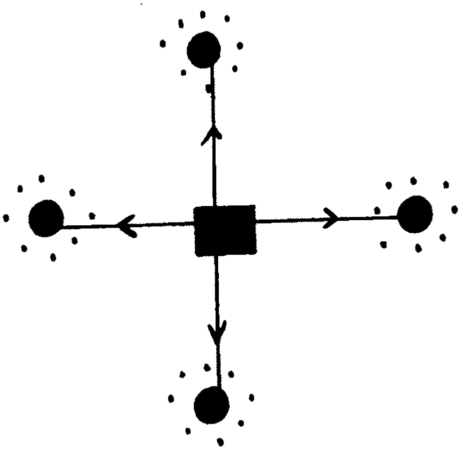


FIG. 3. *Range of course materials designed, produced and updated by a central institution, but offered to consumers by individual schools in response to perceived demand*

A second option (FIG. 3) would be to establish a new national host (there is no logical reason why this should not be a reincarnation of one of the existing library schools) to undertake the design, production and delivery of an integrated programme of continuing education, and to oversee the installation and management of all computer-based delivery systems.

A more radical alternative would be to set up a completely new agency with sole responsibility for providing post-experience education and training in the information/library field (FIG. 4). This approach would require a considerable long-term capital investment, and it is difficult to see how the necessary funds could be raised in the present economic climate. There is little hope that central government could be persuaded to finance such an undertaking. Additionally, there is good reason to suppose that not all library schools would be favourably disposed to such a move, as it would encroach on their present activities.

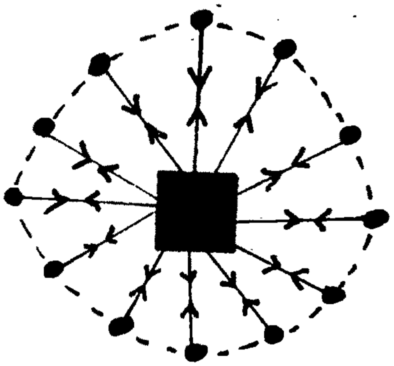


FIG. 4. *Centralised provision by national host direct to individual consumers nationally*

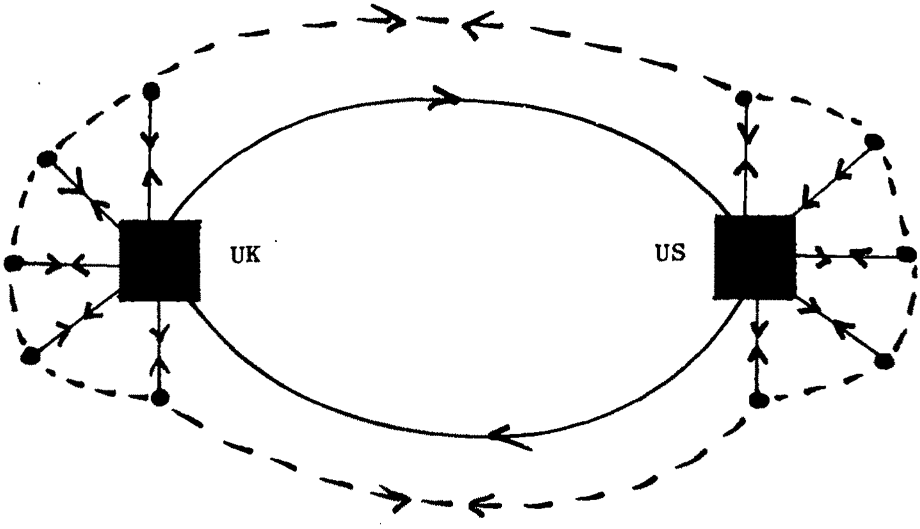


FIG. 5. *Centralised provision by national hosts (in, say, the UK, US and Australia) working collaboratively in design and delivery of courses*

Because distance education is a costly undertaking (in the short term at least) there would seem to be a case for exploring the possibilities of collaboration across national boundaries (FIG. 5.) involving agencies and professional bodies with a vested interest in providing continuing professional education and training for information and library workers. Such an approach would have the obvious merit of distributing costs, and breaking down artificial barriers created by national boundaries.

To date developments in the UK have been slow and piecemeal in character. Post-experience training courses in librarianship and information science to some extent lack currency, comprehensiveness and flexibility[49]. However, it is unlikely that any library school could individually provide the range and scale of coverage which increasingly will be required. It may even be true that the schools collectively lack the expertise to create the sort of network which is called for.

It is all to easy to suggest that the various professional bodies and associations (e.g. Aslib, the Library Association, the Institute of Information Scientists, the Society of Archivists, SCONUL) should pool their plant and expertise in order to improve coverage nationally, but in reality these bodies simply do not have the capital resources to create a centralised delivery system. In broad terms the profession has two options: it can either persist with the present pattern of *ad hoc* provision, or it can aim for national co-ordination (with perhaps the schools and professional bodies working co-operatively). From the profession's point of view the latter is undoubtedly the more appealing option, but, to repeat, it is contingent upon the raising of considerable development funds. The OU's Open Business School suggests a useful model to be imitated, but the information/library profession does not have a fairy godmother like the Management Education Foundation to underwrite the start-up costs.

In West Germany, the German Library Institute has provided funds to develop a number of distance learning packs for librarians[50], but it is unreasonable to suppose that either the OAL or BLRDD could undertake a similar role in the UK. Whilst it may be possible to attract funds from schemes such as PICKUP (as did Newcastle Polytechnic for its statistics course) it is unlikely that PICKUP could be relied upon to make available the sort of funds required to launch a national scheme covering all aspects of continuing information and library education. It is, however, possible that a clearly conceived, carefully costed and rationally argued proposal from an individual institution (or consortium of educatonal institutions) to, say, the SERC (Science and Engineering Research Council) could elicit a favourable response, but this must remain a matter for speculation. A further possibility would be to seek funding from a major foundation.

To some extent the materials which might be used in a distance learning scheme for library and information work could be quarried from existing course materials produced by other public and private sector bodies, thus reducing some of the design and production costs. It would be worthwhile to look closely at the course units currently on offer from the Open University to ascertain their suitability, and to consider ways in which they could be incorporated into existing programmes[51]. Other bodies which have produced computer-based education and training materials include LAMSAC, Henley Management Centre, library schools overseas, IBM and British Leyland

Systems. If nothing else, library educators would be advised to explore the possibility of acquiring and using some of these materials.

Conclusion

In Twining's view, further education in the UK is a classic illustration of an industry which developed a good product some twenty to thirty years ago and which subsequently ignored the imperative to improve and refine that product[52]. The educational system, he argues, is still predominantly subject rather than student based; class rather than individual based, and, generally speaking, designed with the producer's rather than the consumer's convenience in mind. To quote: 'Whatever we may think, there is no God-given rule that people have to learn in schools, colleges or universities. New technology will provide opportunities for the private sector to meet demand unless the education system pre-empts it by looking at . . . customer motivation, product design, supply, marketing effort and price' [53].

Information technology is having an enormous impact on organisational structures and traditional work roles. More and more individuals will have to receive training in information technology, and few professions will be unaffected by current developments. Librarians and information workers in particular will require more and better quality post-experience training in information management and information technology. At present the library schools in the UK are unable to provide continuing education programmes of the scale, sophistication and flexibility needed to satisfy demand. It is in the profession's long-term interests that this situation should be changed. However, as already implied, new initiatives of the kind required are not possible without some considerable injection of funds from without. In the years ahead, individual library schools may improve the range and quality of their continuing education programmes, but what is really required is co-ordinated collective effort, supported and, if possible, jointly funded by the principal professional bodies in the field.

REFERENCES

1. PORAT, M.U. The information economy: definition and measurement. Washington, DC: US Department of Commerce, Office of Telecommunications, 1977.
2. HIGGIN, G. Education in the future: some perspectives. *In: New learning systems.* Coombe Lodge Report, **13**(6), 1980, 205–9.
3. HIGGIN, G. Unsteady state theory. *The Times Higher Education Supplement*, 19 August 1983.
4. MADDISON, J. *Education in the microelectronics era: a comprehensive approach.* Milton Keynes: Open University Press, 1983.
5. DEDE, C. Educational, social and ethical implications of technological innovation. *Programmed Learning and Educatonal Technology*, November 1981, 204–13.
6. *Open Learning—examples of current systems.* Coombe Lodge Working Paper. London: Council for Educational Technology, 1980.
7. *Ibid.*, p. 4.
8. HOLMBERG, B. Aspects of distance education. *Comparative Education*, **16**(2), 1980, 107–19.

9. MOORE, M.G. Toward a theory of independent learning and teaching. *Journal of Higher Education*, **44**, 1973, 661–89.
10. KEEGAN, D.J. On defining distance education. *Distance Education*, **1**(1), 1980, 13–36.
11. *Ibid.*
12. ERDOS, R.F. The system of distance education in terms of sub-systems and characteristic functions: a presentation of analytical methodology. *In:* LJOSA, E. (editor). *The system of distance education.* Papers to the Tenth ICCE International Conference, Brighton 12–16 May 1975. Malmo: ICCE, 1975, pp. 9–19.
13. CRAIG, J. Britain's Open University: text, telly and tutor. *International Education*, October 1980, 1–3.
14. BAKER, K. Information technology training. *Information Technology Training*, February 1983, 1–3.
15. *Open Tech News*, Autumn 1983.
16. *Management Today*, November 1982, 122.
17. WEINGARD, D.E. Continuing education and telecommunications. *Wisconsin Library Bulletin*, Winter 1981, 133–6.
18. *Communication Technology Impact*, **5**(7), 1983.
19. SHARPLES, M. Educational technology and the Open University. *Teaching at a distance*, **22**, Autumn 1982, 15–25.
20. BATES, T.W. Role and implications of television and some implications for distance learning. *Distance Education*, **3**(1), 1982, 28–50.
21. WANIEWWICZ, I. The TV Ontario Academy: the use of television broadcasting and computer-managed learning for adults. *Educational Broadcasting International*, June 1981, 78–81.
22. BATES, T.W., *op. cit.*
23. SALOMON, G. *Interaction of media, cognition and learning.* London: Jossey-Bass, 1979.
24. WHEELER, T.E. Cable TV in the USA: electronic delivery has a rougher ride than paper. *Electronic Publishing Review*, **1**(3), 1981, 205–9.
25. MASUDA, Y. *The information society as post-industrial society.* Tokyo: Institute for the Information Society, 1981, pp. 22–23.
26. EDUCATIONAL RESEARCH INSTITIUTE OF BRITISH COLUMBIA. Learning at a distance and the new technology. Vancouver: ERIBC, 1982 (chapter 2).
27. *Ibid.*
28. MEUTER, R.F. *et al.* Closed-circuit educational television (ITFS) in north-eastern California: the 33,000 square mile campus. Paper presented at the World Future Society's Fourth General Assembly, 'Communications and the future'. Washington, DC, 18–22 July 1982.
29. EDUCATIONAL RESEARCH INSTITUTE OF BRITSH COLUMBIA, *op cit.*
30. HURLY, P. *and* HYLNKA, D. Using videotex in distance education. *In:* DANIEL, J.S. *et al.* (editors). *Learning at a distance: a world perspective.* Edmonton: ICCE, 1982, p. 291.
31. OLGREN, C.H. *and* PARKER, L.A. *Teleconferencing; technology and applications.* Dedham, MA: Artech House Inc, 1983.
32. WINDERS, R. Report on a visit to the University of Wisconsin-Extension, Madison. Plymouth Polytechnic, 1983 (unpublished paper).
33. *Ibid.*
34. PARSLOE, E. Interactive video. *Journal of European Industrial Training*, **7**(3), 1983, 28–32.
35. DUKE, J. *Interactive video: implications for education and training.* London: Council for Educational Technology, 1983.

36. KEARSLEY, G. Instructional videodisc. *Journal of the American Society for Information Science*, **34**(6), 1983, 417–23.
37. DUKE, J., *op cit.*
38. HILLER, J.B. Satellite communications: some implications for libraries. *Australian Library Journal*, November 1983, 26–37.
39. *Ibid.*
40. OLGREN, C.H. *and* PARKER, L.A., *op. cit.*
41. MUNSHI, K. The economics of telecommunications-based distance learning. *Technological Horizons in Education*, **7**(6), 1980, 54–7.
42. *Ibid.*, 55.
43. BIRCH, D.W. *and* LATCHAM, J. *Open learning systems in further education: some aspects of resource management.* Coombe Lodge Working Paper, July 1982.
44. *Ibid.*
45. SEWART, D. Creating an information base for an individualized support system in distance education. *Distance education*, **1**(2), 1980, 171–87.
46. HARTRIDGE, D. Distance education in library and information science: some observations. *Epistolodidaktia*, **2**, 1976, 129–37.
47. EDUCATIONAL RESEARCH INSTITUTE OF BRITISH COLUMBIA, *op cit.*, p. 83.
48. LUNDIN, P. Knowledge networks through satellite communications as a basis for continuing education at a distance. Paper presented at the Annual National Conference of the Higher Education and Development Society of Australia (HERDSA), at the University of Queensland, St Lucia, 14–17 May 1983.
49. CRONIN, B. Information technology and information management: strategies for post-experience training. *Education for Information* 2, 1984, 79–94.
50. CRONIN, B. Continuing library education—an innovation. *Library Association Record*, **83**(9), 1981, 411.
51. DALE, S. Opening up opportunities: distance and continuing education for librarians. *Library Association Record*, **85**(11), 1983, 410–11.
52. TWINING, J. Factors influencing demand. *In: New learning systems.* Coombe Lodge Report, **13**(6), 1980, 197–8.
53. *Ibid.*, 1983.

Letters to the Editor

From Michael Carmel

Resource sharing can work

Once an opinion can be 'stated categorically' it is clearly time it was challenged. I refer to the view expressed by Maurice Line that 'supply from a central stock is much superior to "resource sharing" ' in all the areas that matter.[1]

On the basis of the considerable experience of the NHS and other medical libraries in sharing resources, I should like to put forward the not-quite-contradictory view that central supply via BLLD and co-operative resource sharing should be seen as complementary parts of a single system. In fact the existence of BLLD has been vital to the development of efficient co-operatives in a number of ways:

(a) it has provided a universal back-up service;
(b) it has thereby relieved the pressure to extend the coverage of co-operatives indefinitely;
(c) it has set an example of procedural streamlining;
(d) it has provided a costing and efficiency benchmark against which the financial viability, speed and reliability of schemes can be judged.

The principles and factors which determine the success of co-operative resource sharing are multiple. A useful selection for would-be co-operators might include the following:

(a) Like co-operates best with like, and libraries in similar subject areas have most to offer each other.
(b) Small libraries (1–10 staff) can work together more cheaply and effectively than medium to large libraries.
(c) Co-operatives work better if they are small enough for all the participants to know each other.
(d) The easiest resources to share are periodicals holdings.
(e) Apparently identical libraries in co-operation quickly build up a wide range of periodicals.
(f) Co-operative purchasing is best organised bilaterally (you take *A* and I'll take *B*) or even unilaterally (I'll buy *A* instead of *B* because a co-operating library already has *B*). The basis for this has to be reliable information.
(g) Individual requests for items should go direct to the source, not via a clearing house.
(h) Good co-operation depends on good information. That includes reliability, completeness, accuracy and up-to-dateness.
(i) A periodicals resource sharing system must include a union list and a simple, accurate procedure for updating it; an up-dateable directory;

an agreed (and simple) procedure for requests; and a code of practice covering who may request what from whom, and the mutual obligations of supplying and receiving libraries.

(j) Successful co-operatives have strong central co-ordination.
(k) Every contributing library should be a beneficiary and vice-versa.
(l) Libraries which are heavy net lenders should be compensated, financially or in kind.
(m) Union lists of periodicals tend to proliferate (whenever two or three librarians are gathered, there shall be a union list). Co-operatives can also be tempted to try to cover every possible holding and institution. These tendencies can be quite effectively checked by reference to the true economic cost (including overheads) and performance (reliability, speed, etc.) relative to use of BLLD.
(n) Periodicals are not the most important resource for libraries to share, although, being both the simplest and the most tangible, they are a good starting point for any co-operative. Actually, the most important resources are the knowledge, skills and attitudes of the library staff.

It is by following such principles as these (whether consciously or not) that UK medical libraries have built up quite considerable co-operating regional networks over the last ten to fifteen years from a standing start. Interchange of journal articles is running at, I would guess, about 150,000 items per annum and is rising very fast. Just bringing the whole country up to the level of the most developed Districts will ensure that the figure goes to 250,000. I might add that this growth parallels growth in the use of BLLD by the same libraries—a confirmation of the need to see the two processes as complementary rather than as alternatives.

Yours sincerely,
Michael Carmel,
Regional Librarian,
South West Thames Regional Library Service,
St. Luke's Hospital,
Guildford

1. LINE, M.B. Document delivery now and in the future. *Aslib Proceedings*, **35** (4), April 1983, 137–176.

From A.E. Cawkell

Problems with computers at work

The above title is prompted by Margaret Slater's recent paper 'Problems at work' (*Aslib Proceedings*, **36** (4), April 1984, 201–212). She refers to people questioning their own competence at the time of adopting computer systems for small businesses. These remarks struck a chord because of some recent experiences during consultancy work. My main impression is that people are unprepared for the time it takes to acquire competence – time which must be spent before the time-saving benefits can be reached.

Although 60 per cent of a sample of people over fourteen, when recently asked by Gallup whether they understood the words 'software' and 'micro' said 'never heard of them', the business community can hardly escape them.

The well-cultivated 'progressive' Information Technology image makes us feel inefficient, or even fossilised, if we do not adopt it. Yesterday's (13 May) *Sunday Times* 'Living with the Computer' supplement containing an article headed 'Instant information: tidy, efficient, paper-free', is typical of thousands of such publications. Surely small and medium size businesses should be able to find something to match their requirements from an enormous choice of hardware and software packages, and rejoice in the benefits?

The answer may well be yes, but to get to the operational stage, time must be spent absorbing new knowledge for a two-stage process – purchasing and using. But there is a chicken and egg problem. In order to ask the right questions at the time of purchase, knowledge which can best be gained from experience following hands-on operations is needed.

You can ask people who you think may have the required knowledge and experience before buying, but beware of computer buffs disguised as bona fide users. These people love messing about with computers regardless of time. 'Their attitude towards doing anything useful is beside the point. Fiddling with the thing is an obsession in itself' (to misquote the book *Micromania* by Charles Platt reviewed in *Aslib Information*, April 1984). They will never admit to having had learning problems or unreliable equipment. Their job is to purvey the mystique using a language designed to conceal. Don't listen. To them, experimentation and achievement is rewarding fun, and time rushes by. For you, fiddling-about time will soon exhaust your budget and ruin your schedule.

Buying and installing a system needs sufficient knowledge both about the job to be done *and* computers to be able to ask the right questions about hardware/software performance, operating systems, etc., and assess the value for money of suitable offerings.

When you buy a car, vendors will be pleased to take you for a trial run. There is no way you can take a comparable trial run on your computer. You require suitable software, an appropriate volume of on-board data resembling your own, and your accumulated expertise in order to try out some typical tasks.

In the absence of such a test you will have to assess the suitability of the software available; it may need modifying. You will also need to consider reliability, the storage requirements, back-up, maintenance arrangements, and the probability that the vendor will be in business next year. You may require communications (Note. All communications are a hassle).

Having purchased the system you will have to learn how to get everything to work, polish up your perception of the strengths and weaknesses of paper-based and machine-based systems, understand computer file organisation, and organise work methods combining paper and machine-based data.

There are three aspects which I have found particularly important when attempting to assist people with computer problems at work. They do not usually receive much attention in 'proceed carefully' or 'which one to buy' publications.

Firstly, try and get a software package ('application program') which is known to work well on the chosen machine and which will do your job, or the best part of it, without modification. The intensely competitive software market brings with it 'bells and whistles' salesmanship. Fifty 'features' look better than twenty-five in advertisements, but are the extra twenty-five any use to you?

Don't ask someone to write a new software package if it can be avoided. Some people possess one kind of occupational knowledge (e.g. accountants, librarians, chemists, etc.). Others (computer software writers) have another kind. These two groups find it very hard to communicate. For a chemist it is a great advantage to go to a computer person who knows some chemistry – each can then understand the other's jargon. If you must get a package modified or get a new one written, go to someone with a proven track record for software for your kind of application. It won't be cheap.

Negotiate a satisfactory arrangement inclusive of 'complete' (an unsatisfactory word, but I cannot think of a better one) documentation, ideally with enough leeway to add a bonus for adherence to delivery date. Try and get all the details down in writing and avoid changing your mind later (it may give rise to unquoted cost-uncontrolled modifications). Take every precaution against getting into a situation where the software, almost complete, requires an unforeseen change and you have to decide whether to put good money after what may already be bad money. Never have there been so many 'software experts' about.

Modifying someone else's software is often very difficult; if good documentation does not exist it may be well-nigh impossible. Unfortunately it may be impossible to get documentation for proprietary packages, since providers don't want to reveal how their software works for commercial reasons.

Secondly, the current situation regarding operating systems needs some homework. An operating system is software which manages machine functions and allocates the resources of the machine for the job to be done by the application program (the one which does your specific job).

Most microcomputers run on an operating system which is a *de facto* standard such as CP/M or MSDOS. Your application program will be written to run in conjunction with a designated operating system. The practical effect of this arrangement is that application program writers, knowing that the 'housekeeping' will be taken care of by the operating system, can concentrate on the job in hand without needing to spend time on other problems. Consequently there is a very large choice of programs, some very cheap, designed to run with designated operating systems.

You will need to acquire two kinds of knowledge – about the application software and about the operating system. Operating system commands are used for general organisation. For example you will discover that two quite different procedures are needed for hard to floppy disk back-up depending upon the size of your files and floppy disk capacity.

The newer, faster, 16-bit CPUs enable more sophisticated software to be introduced but larger memories may be needed – 64K must now be reckoned as 'small', and floppy disk storage is becoming insufficient for some activities. A recently introduced microcomputer database package (Dayflo) occupies 1 Mbyte (that does not of course include any provision for the user's records). Visi On, with multiple 'windows' allowing several tasks to be viewed at the same time, requires 256K of RAM memory and 5 Mbytes of disk. Many people will go for a minimum-cost 8-bit solution for today's job. Another £500–£1000 might just buy you an 8/16 bit machine with Winchester add-on facilities for next year's job as well.

Special operating systems and application programs are provided for some of the new machines – Apple's Lisa and Macintosh machines are examples. But you must then choose from a limited (but rather good) number of programs – the huge CP/M choice is closed.

The third, and perhaps least publicised aspect, is the one which requires most attention in information retrieval applications. Information storage and retrieval can bring great benefits (regardless of occupational specialty) in small/medium sized offices – the biggest market for microcomputers.

This aspect really has two parts – adjusting your ingrained paper-based information habits to cope with machine files, and a re-consideration of indexing principles.

Nobody has yet succeeded in designing computer software which follows the curious ways in which paperwork is shuffled about and the way people interact, decisions are made, and office work gets done. This system has evolved over many years and somehow creaks along. A computer-based small-office system on the other hand – let us say a combination of file management, personnel and customer record storage and processing, word processing, information retrieval, accounting and invoicing – is an exercise in systematic formality. It forces concentration upon and changes in working methods which can be beneficial in themselves. It takes some time to re-organise, face up to ways of combining paper and machine-based operations, and appreciate how to make the most of new possibilities.

Unless software is going to be used regularly its complication may require it to be learnt all over again. For instance, try remembering the significance of the way you set up a 'spreadsheet' financial model (e.g. Visicalc) when you want to use it again with some different figures after an interval of a few weeks.

Rudimentary indexing suffices for some office paperwork. Other papers –

for example reports – may require as much attention as scientific articles. Many clues are available about the contents of papers. Visible shelves, drawers, the colour of covers, and even strategically placed piles all help.

Few office software people have heard of Indexing. It is a boring overhead which is never listed among the 'features' in glossy software leaflets. Tangible clues are lost when information is electrically stored. Good indexing becomes essential in personal information systems, but vital in central filing systems to avoid the unacceptable penalty of many people's idiosyncratic indexing.

Indexing in offices is rarely considered to be a professional activity. It is usually someone's incidental chore. This notion will have to be changed, but I will stop at this point, since I am preaching to the converted who will not need reminding about these matters.

A.E. Cawkell, Citech, Uxbridge, England

Costing and the economics of library and information services

Edited by STEPHEN A. ROBERTS

In the light of dwindling resources and increasing user needs, today's library and information service managers need more help than ever in making informed and effective decisions about economic planning and budgeting; an understanding of costing concepts and techniques is essential for those managers who wish to ensure the efficiency and productivity of their services. This volume aims to provide the hard-pressed manager with a balanced selection of readings on the costing of library and information services.

The book is divided into the following sections:
1. Library and information service costs: context and concepts
2. Investigating and measuring the system
3. Basic approaches to service costing
4. Practice and practical studies
5. Towards managerial economics

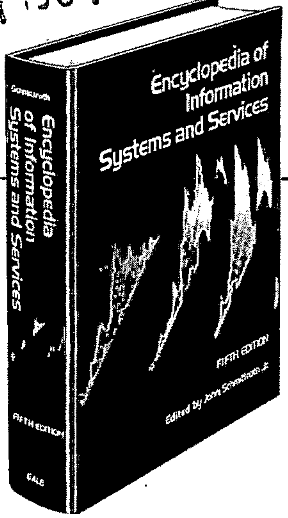
This is the fifth volume in the Aslib Reader Series.

258 × 158mm August 1984 vii, 360pp

ISBN 0-85142-176-8 cased edition
UK £20; overseas £24 (£3 discount for Aslib members)

ISBN 0-85142-177-6 paperback edition
UK £13; overseas £15 (£2 discount for Aslib members)

2 9 OCT 1984


Encyclopedia of Information Systems and Services
Fifth Edition
Edited by John Schmittroth Jr.
Gale

"A classic in the field."
—"Reference and Subscription Books Reviews," *Booklist*

Encyclopedia of Information Systems and Services

Fifth Edition

5th edition. Edited by John Schmittroth, Jr. Anthony T. Kruzas, consulting editor. 1,242 pages. 8½" x 11". 23 indexes. L.C. 82-18359. 1982. $285.00. Available at Gale's 5% Standing Order discount.

Describes 2,500 organizations in the U.S. and 50 other countries that produce and provide access to bibliographic and nonbibliographic information in all subject areas. About 750 entries are new; existing entries have been thoroughly updated. Covers over 16,000 systems, services, products, and programs.

More than 2,000 databases and some 200 online services are described in this edition, more than in any other source. All types of databases are covered: bibliographic, non-bibliographic, online, offline, commercial, governmental, private, etc. The *Encyclopedia* also focuses on online vendors, videotex/teletext systems, telecommunications networks, library systems, demographic and marketing data firms, document delivery sources, software products, and the variety of other organizations, systems, services, and products that are involved in the rapidly expanding field of information technology.

23 indexes speed research

Easy access is provided by indexes to organization names . . . subjects . . . personal names . . . geographic locations . . . types of services . . . publications . . . database names and acronyms . . . online vendors . . . networks . . . etc.

Newly added indexes include:

- The *Master Index*, a single alphabetical name listing of 16,000 organizations, systems, services, databases, publications, software products, etc.
- *Document Delivery Index*, a list of organizations providing document retrieval and delivery services using traditional methods or electronic mail.

Detailed entries

Entries cover these points: Organization and system name, address, and phone . . . Date established . . . Name and title of administrator . . . Staff size . . . Related organizations . . . Detailed description of the function and purpose of the system or service . . . Subject coverage . . . Input sources . . . Holdings and storage media . . . Publications . . . Microform products and services . . . Computer-based products and services . . . Other services (abstracting, consulting, data collection, SDI, research, etc.) . . . Availability . . . Contact person . . . Tollfree phone and telex.

Supplement also available

New Information Systems and Services consists of two softbound issues published between the fifth and sixth editions of *EISS*. $220.00/both.

Available on Standing Order at 5% discount. All Gale books are sent on 60-day approval. Deduct 5% if you send check with order. Customers outside the U.S. and Canada add 10%.

GALE Research Co.
Book Tower • Detroit, MI 48226

To order by phone: **800-521-0707 tollfree.**
In Canada, Michigan, Alaska, and Hawaii: 313-961-2242.

Aslib
Proceedings

VOL.36 NUMBER 10 OCTOBER 1984

Public/private sector interaction: a review of issues with particular reference to document delivery and electronic publishing 373
Blaise Cronin and John Martyn

Using commercial databases online 393
Sylvia P. Webb

Improving your image: how to promote a library or information service 401
Douglas Wood

ISSN 0001 253X

ASLIB PROCEEDINGS

Volume 36 **OCTOBER** **Number 10**

Aslib Proceedings carries papers given at Aslib meetings and conferences, and contributed papers of interest to practising professionals. These describe innovations in information management techniques, applications of existing information products and services, and case studies of information units and special libraries.

Aslib Proceedings is published monthly and supplied free to members of Aslib. Annual subscriptions to non-members: £50 (UK)/£60 (overseas); additional subscription to members: £30/£35. Single copy prices and subscription information are available from the Subscriptions Department, Aslib, The Association for Information Management, Information House, 26/27 Boswell Street, London WC1N 3JZ.

Manuscripts and editorial enquiries should be addressed to the Editor, *Aslib Proceedings,* Information House, 26/27 Boswell Street, London WC1N 3JZ. Manuscripts should be 1,000 to 3,000 words, typewritten, double-spaced, single-sided on A4 paper. Figures should be reproducible. An abstract of up to 200 words should be included. References should follow British Standard 5605:1978. Published authors will receive twenty-five free offprints of their article.

Advertising information is available from the Editor, as above. Further information about Aslib's services and membership rates will be supplied on application to the Marketing Manager, Aslib, The Association for Information Management, Information House, 26/27 Boswell Street, London WC1N 3JZ. Telephone: 01 430 2671; telex: 23667 (answer-back Aslib G).

© 1984 Aslib and contributors

ISSN 0001 253X

Public/private sector interaction: a review of issues with particular reference to document delivery and electronic publishing

Blaise Cronin and
John Martyn
Aslib Research & Consultancy

British National Bibliography Research Fund Report no. 17
(ISSN: 0264–2972)

Foreword

This review of the literature on the interaction between the public and private sectors in information services provision, with specific reference to document delivery and the impact of new communications technologies, was undertaken at the request of the British National Bibliography Research Fund. It covers only the English-language literature, and does not present any particular point of view other than is implicit in the literature covered. Some notes on the issues explicitly or implicitly raised in the review are presented in the final section.

Public/Private Sector Interaction

The *Annual Review of Information Science & Technology* (*ARIST*) is a useful and accurate barometer of trends in the information field. Recent volumes have given attention to the debate surrounding the interaction between the public and private sectors in information services provision. Writing in 1974, Cuadra and Luke predicted that the relationship between public and private sector organisations in providing and developing information services would be one of the major issues of the decade[1]. Judging by the number of publications which have appeared since on the subject they would seem to have been proved correct in their assessment (e.g. Berninger & Adkinson[2], McDonald[3]).

The most ambitious attempt to illuminate what is a complex and vexed issue was the report produced in 1982 by a task force set up by the National Commission on Libraries & Information Science (NCLIS), which undertook a review of interactions among the various sectors concerned with the development of information services, products and resources in the US[4]. The task force sought to explore the issues involved, to identify the conflicts and

Aslib Proceedings, **36** (10), October 1984, pp. 373–391. Printed in Great Britain.

to recommend means for resolving those conflicts. Its point of departure was expressed in the following manner:

> 'Information resources, products and services are vital components of our society, of our economic productivity, of our governmental operation, of our individual growth and well being. They are increasing in their value and importance, however their role may be measured. Government policy should be designed to foster the development and use of information resources and to eliminate impediments to such development and use.'[5]

Interest in the question of public/private interaction has become a topic of international concern largely because of recent developments in information handling and communication technologies. As information services and products become increasingly important elements in balance of trade figures, and as the proportion of the workforce engaged in information and knowledge creation activities grows[6], some national governments have become aware of the importance of information as a tradeable commodity and as the basis of future economic prosperity[7], and this in turn raises questions as to whether information should face the test of the market-place and what the role of the public sector should be in underwriting the cost of certain types of information provision.

Public/private sector interaction is a complex political issue, not amenable to easy resolution. As Berninger and Adkinson note, there is a lack of terminological clarity, the expression 'private sector' often being used without qualifiers. In their view the literature 'offers incomplete and conflicting schemes for deciding what components are embraced exclusively by the private sector'[8]. Likewise, Allen notes the tendency of many people to use the terms 'unrestricted' and 'free' interchangeably when discussing the individual's right of access to government information[9].

Zurkowski has argued that a dichotomous split into public and private sectors is inadequate[10]. In his opinion there are three principal sets of players on the information stage:

1. government institutions and agencies;
2. quasi-government (or quasi-private) non-profit bodies;
3. private sector companies.

A healthy pluralistic information structure, he maintains, is like a three-legged stool, each leg of which is indispensable to the effective functioning of the whole. Government is responsible for establishing the overall framework (as a gatherer of data and statistics, a funder of research programmes, as a regulatory body or referee, and as a stimulator of information-related initiatives in the private sector). The private sector (which includes publishers, booksellers, subscription agents, database producers, information brokers and retailers) is responsible for creating services, for adding value to existing services and for investing risk capital to develop new market opportunities which might not otherwise be opened up. The third leg of the tripod includes research associations, professional bodies, and public libraries, the last of which have a social responsibility for providing and maintaining free access to sources of information for the population as a whole. A healthy information economy, he argues, depends on successful interaction between these three constituencies and the preservation of some form of balance.

Problems and tensions arise when attempts are made to demarcate the roles to be played by each of these mutually dependent sectors and to define the exact degree to which government should regulate and intervene in the market-place. Basically, as the NCLIS report[11] shows, there are two extreme views as to the proper role of national government in relation to information policy and development. Those who favour minimal government control and intervention point out that:

- capitalist society is predicated on the belief that competitive market forces are the best means of guaranteeing that the necessary range and quality of services and products is developed;
- government intervention in the market-place can depress private sector investment;
- unimpeded commercial activity can increase the effective distribution and dissemination of both government and non-government information.

Opponents of the untrammelled free market philosophy would argue that:

- government intervention and control is essential if open access to information generated, processed and ultimately paid for by the taxpayer is to be effectively maintained;
- the rights of the citizen must be protected against vested, selective or short-term commercial interests;
- information needs not met by the market-place have to be covered by government-sponsored initiatives; and
- government has a real and positive role to play in stimulating the market-place through subsidy and enlightened leadership.

As Hayes notes, the debate which has grown up in recent years hinges on the interpretation of the government's proper role in the market-place[12]. However, elucidation of the central issue has been hampered by the lack of clear definition and the fact that there are no established rules or explicitly defined array of choices — a point made in a recent Monitor review of subsidy in the information industry[13]. The NCLIS report observed that 'charges of "market failure" are met with accusations of "unfair government competition"; demands for "market determined allocation of resources" are a cause of concern for the "information disadvantaged"; the needs for "open availability of information" are countered with wishes for "diversity of choices" '[14].

A further consideration which bears on the right to exploit information products is the essential dependence of the private sector on the public for much of its basic raw materials. This is best illustrated by the following passage from the Royal Society study of the scientific information system in the United Kingdom[15].

> 'In the United Kingdom, as in almost all countries, the financial support of fundamental research is largely a national responsiblility, so the major ultimate financial provider is the taxpayer. The scientific information system is not funded in its own right but as a part of the state's financial support for science, research, scholarship and education. Thus, grants from science-funding agencies pay for the creation of the information (that is, the research itself), and the majority of scholarly authors receive salaries from a university or governmental research institute which obviates the need for the publishers to pay them fees or royalties for their written work. Similarly, research workers in industry are not paid for writing their papers. The main national, public and university libraries are funded from the public purse and these form the major market for advanced scientific publications: some sales are also made to industrial libraries and to private individuals, but these are of lesser significance in the United Kingdom. So although some parts of the system have the characteristics of a competitive free market, the publishing and printing industries being clear examples. the system as a whole is largely dependent on public funding.'

In recent years the information industry (defined as including hardware, software and other information-related products) has expanded enormously and the revenues generated by the sale of information services and products grown exponentially. This growth has been facilitated in part by the conviction that information can be viewed as a resource and a commodity (although a commodity with unusual characteristics); one which has a cost, a price and a value. The stakes and the profits in the information industry are high, and increasingly the business community is prepared to pay for customised services and products. Information is spoken of as the new capital, and seen as a source of wealth[16]. This has led many commentators to speak of the information-rich and the information-poor. Those who can pay for information are seen as having an advantage over those who are reliant on publicly-provided services. Those most alarmed at the widening gulf between the information-rich and the information-poor (a gulf exacerbated by the new technology) would like assurances that the individual's right of free access to information, traditionally provided via public library services, will be maintained. The NCLIS report in fact speaks of an 'information subsistence-level', meaning that individuals need information for their personal and social development as they do medical and welfare provision[17].

Stonier has likewise made the point that wholly private education or health care systems do not reach the poorer members of society[18], and that there is a need for government mechanisms to ensure that the rights and needs of the disadvantaged are served. Within the public library community there is a widespread belief that this principle should be applied to information provision, and that libraries should remain what Kaltwasser terms 'instruments for access to unbiased freedom of thought' which 'serve the unfettered development of knowledge and public opinion'[19].

There is some concern that the increasingly popular notion of information as a saleable commodity will lead to the development of high-cost services and products for specialist markets willing and able to pay the going rate, which will be beyond the financial reach of the public sector services. Publicly-provided services, of lesser quality but much lower in price (if not free) may be squeezed out of existence by the high-cost high-quality product. From an economic viewpoint the public library represents a decreasingly significant segment of the overall information market, and as such will be less able to fulfil its traditional role as the universal information provider. In some quarters there is an ill-disguised fear that libraries will be downgraded to storehouses for materials with limited market appeal. Unlike many of the other players on the information stage, libraries are undercapitalised and lack a tradition of developing value-added products or services of their own for sale on the open market. As a consequence they are unable to compete on an equal footing and are vulnerable to changes in the mood of the market-place. The net effect of this trend may be that the user will receive a poorer level of service. One possible solution to this seemingly inevitable trend might be to abandon the Victorian principle of free service and to institute some form of charging policy (blanket or differentiated). However, the library profession has traditionally resisted such pressures, and there is little evidence to suggest that it would voluntarily adopt a fee-based approach.

Suggestions for pricing policies to be adopted by the public and private sectors have been advanced by Horton[20]. He relates the level of pricing, from 'free' to 'fully competitive market-place pricing', to the level of information need, or urgency of need, classifying information as 'edifying', 'enriching', 'enlightening', 'helping', or 'coping'. Implementation could prove difficult, in relating a charge to the use of information rather than to the information itself, so that under different circumstances, different charges might be levied for the same product, but the analogies with welfare economics are interesting.

Moving on from the abstract discussion of freedom of information and the mediating role of public sector and governmental organisations, we shall now consider one area of interaction currently attracting attention, namely, document delivery and the impact of electronic publishing on the traditional information supply and delivery chain. Document delivery has been described as 'the chain of events occurring between the time a person receives a reference to a document which he wishes to acquire, and the time he receives the document to which his reference relates'[21]. Usually this is taken to mean the supply of the original document or an acceptable hard-copy surrogate which remains the property of the requesting individual. Virtually all requests to supply documents other than purchase orders directed to a bookseller or publisher have been handled by libraries operating within some more or less formally defined inter-lending network.

This picture is beginning to change as a result of developments in electronic publishing. As Line notes, the new technology will increase private sector involvement in the handling and dissemination of information, and may as a result upset the balance which has for a long time existed between the two sectors[22].

Until recently the primary journal of literature was typeset, printed and then distributed to (in the main) institutional purchasers. Typically each library would take out a single subscription to one or more journals. Libraries which did not subscribe to particular titles could nevertheless obtain copies of particular articles or issues via the inter-library lending system. This secondary production cycle is independent of publisher control. Although libraries constitute the major purchasing bloc for STM (scientific, technical and medical) journal publishers, the existence of the inter-library lending system means that publishers are in principle denied follow-on royalty payments. From the publisher's viewpoint the sale of a single journal to an institutional purchaser could result in *n* copies of all or part of that document being made on an at-cost basis to the user, and the user in turn making a further *n* copies for 'down-the-line' distribution. In this situation neither the author nor publisher has any control over their property (copyright legislation notwithstanding) after the initial sale. This is a major concern for many publishers, but there is a distinct lack of hard evidence to support the view that publishers are suffering real financial loss[23,24].

However, if continuing cash shortages enforce cancellation by libraries of subscriptions to expensive primary journals other than titles which can be considered as 'core' to users of the libraries, as recommended by Emsley and Jenkins[25], then clearly some losses could be felt by journal publishers, although in such circumstances the losses would not be attributable so much to photocopying in the first instance as to the high cost of journals.

With new developments in electronic publishing the problem may be to some extent resolved, as documents are moved in digitised or hard-copy form by publishers direct to users on demand. The technology already exists to bring the user and the producer into direct contact, thereby potentially eliminating the library from the document delivery chain. From the publisher's point of view this scenario is superficially appealing. If the publisher (or publishers working in consortia) can integrate the creation, storage and delivery processes in a technological sense, then they can monitor real demand, sort profitable from non-profitable titles, and experiment with pricing strategies. However, as Martyn and Singleton note, technology could well have the effect of reducing the publisher's role in production and distribution to providing and operating a host computer and its associated software[26].

The surface appeal of on-demand publishing, from both the publisher's and the user's point of view, is that it eliminates waste and allows information to be packaged in 'modular' form[27]. There is, however, a sting-in-the-tail effect. To quote Martyn and Singleton again:

> '. . . if a journal issue has ten papers in it and a sale of a thousand copies, the thousand subscribers buy all ten papers, and if they each pay ten pounds for their copy, the publisher receives ten thousand pounds. In future, if a 'subscriber' can select and pay for only those papers which he actually wishes to read, and each subscriber only wants

to read two papers out of the ten, at the same pro rata cost the publisher will only receive two thousand pounds.'[28]

It was recently estimated that on-demand publishing will grow 430 per cent between 1980 and 1985[29]. Such a development could have far-reaching implications for authors, publishers, librarians, brokers, and the users of the literature, but because electronic publishing is still in its infancy it is difficult to assess with any degree of accuracy the likely effects of such changes on the traditional publication and dissemination cycle. We shall now consider in some more detail the possible benefits and detriments of such changes from the perspectives of the various players involved.

Document delivery is big business. Some 20 million documents are made available annually through inter-library loan networks. Approximately 16 per cent of all document requests in Western Europe are processed by the British Library Lending Division (BLLD). An analysis of BLLD loans by Elsevier found that 60 per cent of all requests were for articles in the life sciences, and of these 80 per cent were for papers produced within the previous five years[30]. Figures such as these are cited by publishers as evidence of lost revenue and of the inadequacy of the notion of 'fair copying'.

According to a 1980 survey of the document delivery industry, annual revenues in the US are of the order of $5m to $10m and growing[31]. The services involved can be divided into three main categories:

1. information providers;
2. information brokers; and
3. libraries.

Information providers are companies responsible for the creation and maintenance of one or more databases. Some, such as the Commonwealth Agricultural Bureaux are public sector (or, more correctly, not-for-profit) while others, such as Predicasts, are commercial companies. For these organisations, document delivery is a secondary function arising from the fact that they collect, abstract and index the primary literature of a particular subject field. Information brokers, on the other hand, provide a range of tailor-made services for fee-paying clients. For some, such as FIND SVP or Information on Demand, document delivery is a major activity; for other, smaller, companies, it is not such a profitable undertaking. As a general rule, the greater the volume of requests processed the more economically viable the operation. Unlike information brokers, libraries are not driven by the profit motive, but offer document delivery as an integral service to their users.

With the growth in the number of online databases and in the volume of online use, there has been a concomitant increase in the number of document delivery services offering electronic document ordering and request fulfilment services. Typical of these is Lockheed DIALOG's Dialorder service which offers the online user a choice of more than sixty services. As the Link report notes, the possibility and attractiveness of full-text databases may in due course pose serious threats for those currently involved in the document supply business. Another threat to commercial fulfilment services, in the short to medium term, is the increasing level of co-operation between libraries as back-up suppliers[32].

Central to any discussion of sectoral interaction in relation to document delivery is the question of copyright. Although a number of studies of document delivery have given prominence to matters of copyright protection (e.g. Gillespie *et al*[33]), the problem remains seemingly intractable from a practical point of view. The publishers' view is that large-scale document delivery is a blatant infringement of copyright and a cause of lost earnings. The guilty parties in this state of affairs are not merely libraries (whether local, regional or national), but also information providers and brokers who actually make money out of providing documents on request for clients.

On the other hand, concern is expressed in certain quarters that public sector interests may be affected adversely when full-text systems and (electronic) document delivery become more widely available, if only because such a move would result in excessive protection of the copyright monopoly[34], with access to certain types of information becoming increasingly dependent on an individual's ability to pay or on being a member of a closed user group.

In the US, the Copyright Clearance Centre (CCC) is a body funded by the publishing industry to centralise the negotiation of copyright clearance and royalty payments on behalf of information brokers. However, it is currently estimated that the CCC's policing activities affect only 2 per cent of total US supervised copying[35].

Although copyright infringement is a widespread phenomenon[36], not all those involved in the document delivery process are guilty of malpractice. Many libraries do make at least token efforts to ensure that the reasons for copying are not mercenary, but of course the mere fact that self-service photocopying facilities are commonplace makes the strict enforcement of copyright legislation a virtual impossibility. The same applies to some information providers. The basis of the Original Article Tear Sheets Scheme (OATS) operated by the Institute for Scientific Information (ISI) is that the company agrees to purchase five copies of each of the journals cited in its source indexes and in the first instance literally to tear articles from these to fulfil requests for documents from its users. Chemical Abstracts, on the other hand, requires that information brokers ordering documents from CAS must sign a letter of intent agreeing not to photocopy materials received. Nevertheless, these service-providers have no control over the practices of their clients or the ultimate end-user as far as subsequent copying is concerned.

Perhaps the single most interesting and potentially far-reaching attempt to solve some of the problems associated with copyright was the proposed publishers' consortium, Adonis, first announced in May 1981. The overall objective was to 'modernise document delivery and circumvent the widespread practice of legalised and illegal photocopying in so far as scientific, technical and academic journals were concerned'[37]. This was to be achieved by publishers storing their journals on high-capacity digital-optical disks and by satisfying requests for copies on demand. It was further proposed that a number of centres be identified internationally (including BLLD) to act as clearing agents for requests arising. For a variety of reasons the venture has still to get off the ground[38], but the long-term implications of such a move have been widely discussed in the professional literature.

Adonis-like proposals raise many questions about the ways in which the journal literature will in future be created, stored, located, and disseminated. The aim of the Adonis scheme as originally conceived was not simply to squeeze out the intermediary community but to impose a greater measure of regulation on the document delivery process. To quote Maxwell, the objectives were 'to help libraries with a cheaper, more efficient and faster document delivery service than they now have and to recoup some of the income now being lost to photocopying'[39]. However, the very possibility of schemes such as this being set up raises questions as to the long-term future of the scholarly journal in its present form. As things stand, the vast majority of scientific and scholarly journals is available in print-on-paper form, but dual-mode publishing is increasingly likely, and in time the balance may (at least as far as STM journals are concerned) shift in favour of electronic publishing. If articles are to be made available on demand as separates, then we need to ask whether libraries will continue to subscribe to whole journals or simply request selected articles for specifically defined needs[40].

There is, as Line has pointed out[41], a high concentration of demand for articles within particular journals, although this is probably less than the concentration on journal titles. The evidence suggests that one or two per cent of all articles account for half of all demand. With the increasing cost of journal subscriptions being counterpointed by contraction in libraries' acquisition budgets, on-demand publishing has a certain obvious appeal.

There is little doubt that moves in the direction of publisher-controlled on-demand distribution of the primary literature will focus attention on levels of use and journal cost-effectiveness. A wholesale move from the tradition of subscriptions to journals in favour of on-demand article collection could have serious consequences for the users of the literature. In areas such as the humanities or the social sciences, where serendipity and browsing play an important part in the information-gathering habits of scholars, the user will be seriously disadvantaged. If, for reasons of cost or storage, publishers were to decide that certain journals would be removed from their files after, say, five years, then those communities of users traditionally reliant on archival materials would suffer — unless, of course, their library had undertaken to buy back-runs or maintain full journal subscriptions. For this reason, it is possible to envisage a situation in which libraries become a dumping ground for low-appeal, out-of-date and commercially non-viable products. If publishers' programmes were to be dictated by market forces alone, then it is not inconceivable that the primary journal literature could shrink dramatically. In such a scenario, public sector institutions such as libraries would have to accept responsibility for preserving the traditional balance, and in so doing underwrite in effect the losses which would otherwise be incurred by publishers. It is the possibility of such developments that raises the issue of the appropriate relationship between the public and private sectors in the provision and maintenance of access to the world's literature, a view expressed by Line in the following manner:

> 'The ecological balance of authorship, publication, distribution and consumption is a highly delicate one, depending to a large extent on the balance between public and private sectors. If the present balance is to be disturbed, in the interests of all concerned some new accommodation must be sought.'[42]

Implicit in the quotation above is the view that the present system of complementary interaction is in the best interests of all the parties concerned. A mixed information economy, it is often argued, ensures that the 'public good' is not sacrificed to limited commercial interest. From the user's perspective, BLLD (and similar document supply agencies in other countries) provide a convenient one-stop solution to the problem of document delivery. This, of course, is only possible because BLLD stocks such a wide range of current and out-of-print journals — 140,000 in total, of which 50,000 are current[43]. Assuming that publishers were to exercise greater control over their products, then, as intimated earlier, there would be a distinct possibility that they would rationalise their holdings with the result that certain users would effectively be denied access to the archival literature. The existence of agencies such as BLLD ensures that users do in fact have access to an enormous storehouse of minority and hard-to-find literature, and for this reason it can be argued that they are operating in the best interests of society at large.

Discussion of document delivery rarely seems to take account of the views and opinions of authors, who, after all, are responsible for the intellectual input at the centre of the publishing-delivery debate. White feels that it is essential to draw authors into the debate 'as a counterbalance to the vested commercial interests of publishing and database operations'[44]. It is not, however, immediately obvious in what ways authors might wish to make their collective voice heard. As far as STM journal publishing is concerned, the rewards to authors are intangible, i.e. their works are accepted for publication in a journal which is subsequently distributed among an attentive audience, and their contribution to scholarship duly noted (favourably or otherwise) by their peers. It could be argued that legal and illegal photocopying increase an author's salience by increasing the dissemination span.

One of the features of an integrated electronic publication system is that authors, having once created the text online and entered it into the system, can, in theory, make subsequent modifications. Line has expressed concern that this lack of textual stability could create difficulties when it comes to identifying and retrieving the definitive version[45]. From the author's point of view, the prospect of being able to enhance one's publications is no doubt appealing, but from the user's viewpoint (and from the viewpoint of bibliographic control) such a situation could cause very real headaches. Publishers and authors will clearly have to give some attention to this matter if electronic publishing is not to spawn a new generation of document identification and delivery problems.

Until a publishers' consortium or cartel is set up and its pattern of operation established long enough for it to be possible to assess the likely long-term implications, we are left in the position of having to guess the effects of such a development on the publication chain and, in particular, on the users of the literature.

However, two possible consequences of an Adonis-like scheme could be (1) a reduction in the range of titles maintained by individual publishers (non-profitable titles being weeded out), and (2) additional pressure being placed on public sector libraries to take responsibility for the archival function — albeit working in close collaboration with publishers. The second of these possibilities is the less problematic, as the interests of users would continue to be safeguarded if publishers adopted an enlightened role in discharging their 'social responsibilities' and appropriate funds were made available to the depository libraries to safeguard the interests of users.

More serious is the possibility that publishers (armed with more refined management information arising from their use of a centralised production, storage and distribution system) might eliminate from their portfolios non-viable or low-appeal titles. It has long been recognised that the great majority of citations to the literature are concentrated on a small proportion of the totality of published papers, and that a small percentage of all publishing scientists account for the great bulk of original and innovative thinking. The application of this Lotka-like distribution to journal sales performance could have dramatic effects if strictly applied by publishers. It is not altogether inconceivable that publishers might be persuaded to prune their inventories, concentrating on those journals with an established readership or journals covering emergent and potentially popular specialities.

Allowing, for the sake of illustration, that publishers might begin to apply strict market criteria to the development and management of their inventories, then we need to consider the effects of such contraction on the publishing practices of would-be authors. If the pool of commercial journals is reduced, authors will be competing for fewer outlets and the overall rejection rates will rise dramatically. What will happen to the inevitable surplus? One can envisage a proliferation of fringe journals (a new and vast grey literature with all the bibliographic control problems that would entail) to soak up the overspill, and in due course the emergence of a clear demarcation between the 'quality' journals and the increasing tail of 'also-rans'. It is not difficult to grasp the implications of this trend if the reasoning is pursued to its logical conclusion.

In a discussion of the economics of information, Estabrook argued that 'as information becomes more important, the owners of capital will appropriate the information utilities'[46]. There is already considerable evidence of such a trend in the online information retrieval industry, as, for example, in the takeover of BRS by Thyssen Bornesmisza[47,48]. This suggests that the information sector of developed economies will become progressively commercialised, with investors and interlopers viewing the nascent industry as a source of new profits. This point was also made recently by Line: '. . .much interest is now being shown by major commercial concerns that hitherto have had little or no involvement in scientific and scholarly publishing but have an interest in the relevant technology or *believe there is money to be made in electronic* *publishing*' [italics added][49]. The net result of large-scale capitalisation may mean that in due course scholarly publishing will 'no longer be a specialist business but a part of much larger and diversified industry'[50].

Both Line and Estabrook seem to be saying that the hegemony of profitability in emergent information societies will increase the marginality of libraries and in turn disadvantage large sections of the community. Estabrook does not feel that libraries have ever really operated as 'socialist institutions', and argues that as the information industry grows, they will become 'directly subject to the needs of capitalist society'[51].

The argument for maintaining some sort of balance is to ensure a healthy degree of inter-sectoral competition and thereby protect the individual's right of access to information. It is a more or less implicit tenet of democratic societies that freedom of information is a good thing per se, and that information has the properties of a public good — 'more for you doesn't mean less for me'[52]. Furthermore, some kinds of information have what economists term 'substantial positive externalities or spillovers'; in other words, information can provide benefits to others besides the direct recipient or user. Thus, the preservation of a public access facility and the maintenance of what Becker calls 'sunshine laws'[53] are, in the long-term, general interests of society as a whole.

The likelihood of a publishers' consortium for electronic document delivery being set up in the near future is high, although the services offered will, initially at least be targeted at certain specialist (and financially robust) segments of the overall potential market. The report produced by the Printing Industry Research Association (PIRA) in 1982 for the Commission of the European Communities found that the great majority of publishers were in favour of collaborative action[54]. However, in this study of the relationship between user needs and technology options there is virtually no discussion of the possible harmful effects of increased privatisation, apart from the inclusion of a number of comments by librarians and information officers on the implications for BLLD[55].

In the literature we have seen and reviewed, there is little explicit discussion of public/private sector interaction. The embryonic debate which is taking place would appear in the main to be the result of Line's determined attempts to highlight important underlying issues and problems. On the macro level, there is, particularly in the US, a growing concern generally in the consequences of increased privatisation in the information industry. In his book *Who knows: information in the age of the Fortune 500*, Schiller has produced a helpful framework for analysis and future discussion. The following quotation should serve as a useful starting point:

> '... continuing and far-reaching changes are occurring in information and communication technology. Again, this is a double-edged situation. In some instances the new technology encourages mergers and combinations which enable higher capacities of information handling to be utilised more efficiently and to extend the control of already giant structures. At the same time, the possibility for long-term consolidation

> and stabilisation are reduced, at least temporarily. The uncertainties attendant on a rapidly changing technology arise from the possible obsolescence of facilities, from the loss or gain of markets, and possibly from the entrance of new competitors. How the balance eventually will be struck in the information field is not completely predictable at this time. The strength and commanding positions of the giants in the communications sector — especially the equipment producers and media owners — suggest an eventual absorption of the new technologies into the hands of a few super-corporations.'

Following on from this , '. . . not only do those with the ability to pay gain advantaged access, but eventually — and, ultimately, most importantly — they become the arbiters of what kind of information shall be produced and what is made available. The market unsentimentally yet inexorably confers this authority on those with the fatter bank accounts'[56].

It is difficult in reading the 'Futures' literature to escape the feeling that some analysts' critical faculties have been coloured by 'the onward-and-upward rhetoric of . . . the electronic mythos'[57]. A simple equation seems to dominate much of current thinking:

Technology + Information Awareness = Profits.

There are, of course, strong economical, ideological and historical arguments for creating and encouraging an open, competitive information market-place, but careful consideration needs to be given to the extent to which market demand and the profit motive should be given free rein and the degree to which government should actively involve itself in 'making information available to the public'[58]. In Morehead's view, the relationship between public policy and access to information can be perceived as 'a triadic relationship, an often unholy trinity consisting of supplier, custodian and user' in which the goals of supplier and custodian do not quite dovetail in meeting the needs and interests of the ultimate user'[59].

Line is clearly concerned that new and imminent developments in electronic publishing may endanger the 'Middle Ground' between producers and consumers, and feels that 'joint public ownership' of this area is called for if the best interests of the greatest number of users are to be served[60]. In the ideal world, information producers and consumers could, as Dizard suggests, be 'linked in a network operated as an information utility by commercial common carriers', for which, he feels, 'no general laws would be required other than those already governing publishing — copyright, libel and the like'[61]. Unfortunately, Dizard (and he is not alone in this) does not specify precisely how the relationship between the public and private sectors might be worked out and what the practical problems might be.

As the NCLIS report made abundantly clear, there are no simple answers or solutions to the problem of private/public sector interaction in the provision of information services. Decisions will ultimately be taken on the basis of political considerations, and, as Line notes, 'for better or worse, politics and information will be even more inextricably mixed than now'[62]. Branscomb is not alone in feeling that 'all citizens should be entitled to enter the information age and share in its benefits'[63], but before this situation is reached there will have to be much more, and better focused debate, on the practical, commercial and political factors which will permit such a state of affairs. The 'rules of the game', to quote van Rosendaal[64], need to be clarified and agreed upon if this thorny issue is to have any chance of being resolved.

Issues and problems

Of the various issues raised by the material reviewed here, some are of general interest, and others are, to some extent, more specific to one sector of the community than to others. A convenient approach is to group the various issues according to those most concerned, these being publishers, the library community, citizens, and authors. The public or government interest tends to cover all these groups except the publishers, but as it may be the case that the best interests of one group conflict with those of another even within the public sector, it is more helpful to consider them separately. No attempt is made to rank issues in terms of importance, urgency or intractability.

A general problem, although not apparently a general concern, is the need for agreed definitions of terms. This is particularly noticeable in discussions of freedom of information, in which questions of unimpeded access to information are confused with tarification issues, and occasionally with data protection.

Another general issue is the broad question of what the role of government vis-à-vis information services should be. This is more a matter of the political style and coloration of the government concerned than of information per se, depending on whether and to what extent information is seen as a commodity or as a public good. In this review, which surveys the English-language literature, the problems of public/private sector interaction have necessarily been seen in the context of more or less capitalist societies; there could be some value in carrying out some analyses of the issues as they present themselves in non-capitalist or planned economies.

Clearly a dominant and generally relevant issue is that of copyright, inasmuch as questions of the ownership of and exploitation rights to intellectual property are implicit in many of the concerns expressed in the literature reviewed. The problem is essentially one of striking a balance between private property rights and the public interest, with occasionally some doubts as to what exactly the private property is, and who is the proprietor.

Issues primarily affecting the publishers are chiefly related to increasing revenues or protecting existing revenues. The debate surrounding photocopying, and a part of the pressure to develop publisher-controlled document delivery systems, can be seen as arising from both the desire to secure additional income from the sale of copies of published material and the desire to protect revenues from the sale of material at the time of its first publication: in journal terms, sale of separates plus preservation of subscriptions. The existence and growth of library networks, which tend to facilitate the increased exploitation of individual copies of published materials, are seen as a threat both to publishers and to commercial document delivery agencies. On the other hand, online access to whole-text information services could be seen as a threat both to commercial and public-sector document agencies, but as a benefit to the publisher.

Issues affecting the library community specifically are generally related to the future role of libraries (particularly public libraries), and in the extreme case to their continued existence. There is a real concern that in a future in which the continued availability of a publication is related to its ability to attract revenue, it is possible that the public sector could find itself obliged to assume the role of dumping-ground for low-appeal, economically unviable publications, and provider of services in only such areas as are financially unattractive. In such a scenario, the public library could find itself in an exposed position, with its remit and capabilities increasingly curtailed to the point at which its extinction became inevitable. Electronic publication technology simplifies the elimination of the library from the document delivery chain, although it may be that a single service-point such as a library would be more in the public interest than the multiple suppliers implicit in publisher supply. Another library concern arising from the potential of electronic publishing is the problem of archiving. There is not only the practical problem of how to archive a document which exists only in electronic form, but the much harder problem of deciding what constitutes the archival form, given the possibilities for continuous amendment of text. What should be archived, and by whom, is a related issue.

Two major issues are classed here as being primarily of concern to the citizen. This is not to say that libraries or publishers are uncaring about these issues, or conversely that the citizen is unconcerned about the survival of libraries or the incomes of publishers; it is rather that some issues can properly be seen as matters of broader public concern, relating to the type of society in which we live. The broad questions of access to information constitute one issue, and the future of the journal, or the ways in which future scientific and technical authors will publish, is the other. Free access, as has been noted above, tends to involve both the extent to which the citizen is legally able to see and use information of all kinds, and the extent to which such sight and use shall require payment from the citizen. Freedom of access in principle includes access to information held by government but not necessarily published; the payment issue tends to affect particularly the use of computerised guides to published literature. Publications available only in electronic form present problems as requiring both expensive equipment for their access, and payment for their consultation (on each occasion, unless downloaded; unlike a printed text which, once purchased, can be used repeatedly without further charge). Free access to information is more or less generally accepted in principle, although the issue of which information is still debatable. The question of payment for information is still largely unresolved, and often discussed in terms of what services should be offered free of charge, or at a reduced charge, to whom, by the public library service; in general, some payment for value-added services is accepted, the issue being largely about who should pay. The need to protect the rights of the informationally underprivileged, by ensuring that their access to information is not determined by their ability to pay, is stressed by a number of writers.

The future of the journal is a less clearly-defined issue. The freedom to publish is a part of the scientific tradition, and is considered as a fundamental right, but in circumstances under which publication is determined by the possible revenues to be secured, it may be difficult to publish material of low or minority appeal. The extent to which criteria of scientific quality and originality, now protected by the system of peer review, may be replaced by more overtly commercial criteria, is unclear. It is perhaps surprising that the possibility of 'bulletin-board' publishing is not discussed in the literature. Under this system, an author would pay an electronic host to insert a publication in the system; the host could collect a charge for each access to the publication, deduct a commission and pay the balance to the author. The risks to the publisher or host are reduced, the returns to the author possibly increased, and the only controls on the system are the extent to which the authors are confident of the quality of their work or are prepared to fund their egos. This is an extreme scenario, but less dramatically, some authors see considerable increases in 'grey' literature, and reductions in the primary journal literature, tending to reduce the amount or the accessibility of information.

At the beginning of this section, the groups concerned were noted as being publishers, libraries, citizens, and authors. Most of the issues discussed here affect authors to some extent. In the scientific and technical context with which we are primarily concerned, the authors' chief need is for mechanisms which will give maximum exposure to their work. As they are not normally paid for their journal publications, they are not concerned by photocopying, except insofar as it increases the exposure of their work. The future of journals and other structures in which this work may be made available is of great concern, as is the existence of libraries in which it may be preserved. Ownership of information is not an issue, provided parenthood be acknowledged. The price for which it is sold is largely irrelevant, since none of the income is returned to the author. None of the literature reviewed was specifically concerned with the author, and the only issue presented here is therefore an implicit one, that of the extent to which the authors should be consulted in the course of future development of electronic publishing systems. At present, they are the only players who seem to lack a voice.

REFERENCES

1. CUADRA, C., *and* LUKE, A.W. *eds. ARIST*, 9. Washington DC: ASIS, 1974 (preface).
2. BERNINGER, D.E., *and* ADKINSON, B.W. Interaction between the public and private sectors in national information programs. *ARIST*, 13. Washington DC: ASIS, 1978, 3–36.
3. MCDONALD, D.D. Public sector/private sector interaction in information services. *ARIST*, 17. Washington DC: ASIS 1982, 83–97.

4. NATIONAL COMMISSION ON LIBRARIES AND INFORMATION SCIENCE. *Public sector/private sector interaction in providing information services.* Washington DC: NCLIS, 1982.
5. *Ibid.*, viii.
6. CRONIN, B. Post-industrial society: some manpower implications for the library/information profession. *Journal of Information Science*, 7, 1983, 1–14.
7. CABINET OFFICE INFORMATION TECHNOLOGY ADVISORY PANEL. *Making a business of information.* London: HMSO, 1983.
8. BERNINGER *and* ADKINSON, *op. cit.*, 11.
9. ALLEN, K.B. Rector panel: views from government, libraries and the information industry. *In: Scholars' access to information: public responsibility/private initiative. Minutes of the Ninety-Ninth Meeting of the Association of Research Libraries, October 29–30*, 1981. Washington, DC: ARL, 1982, 21–26.
10. ZURKOWSKI, P.G. The financing and governance of information networks of the future: private sector. *In:* BOAZ, M. *ed. Strategies for meeting the information needs of society in the year 2000.* Littleton, Colorado: Libraries Unlimited, 1981, 171–176.
11. NATIONAL COMMISSION ON LIBRARIES AND INFORMATION SCIENCE, *op. cit.*, viii.
12. HAYES, R.M. Politics and publishing in Washington: are our needs being met in the 80s? *Special Libraries*, **74**(4), 1983, 322–331.
13. *Monitor*, **28** (June), 1983, 3–4.
14. NATIONAL COMMISSION ON LIBRARIES AND INFORMATION SCIENCE, *op. cit.*, 1.
15. SCIENTIFIC INFORMATION COMMITTEE OF THE ROYAL SOCIETY. A study of the Scientific Information System in the United Kingdom. British Library R & D Report 5626. London: Royal Society, 1981.
16. STONIER, T. *The wealth of information: a profile of post-industrial economy.* London: Methuen, 1983.
17. NATIONAL COMMISSION ON LIBRARIES AND INFORMATION SCIENCE, *op. cit.*, 34.
18. STONIER, *op. cit.*
19. KALTWASSER, F.G. Libraries as information service agencies. *IFLA Journal*, **8**(2), 1982, 147–158.
20. HORTON, F.W. The public-private sector role controversy in producing and distributing information goods and services. Unpublished paper, Washington DC 1982 (Cited in BEARMAN, T.C., and PRICE, D.S. Public Sector/Private Sector Interaction in Providing Library and Information Services. The Bowker Annual of Library and Book Trade Information 28th Edn. pp. 42–47. New York: Bowker, 1983).
21. MARTYN, J., *and* SINGLETON, A. *Final report on DOCOLSYS: document identification, ordering and location systems.* London: Aslib (Confidential report to the Commission of the European Communities), 1983.
22. LINE., M.B. Public vs private sector interaction. Paper prepared for the British National Bibliography Research Fund, 1983 (BNBRF (83) 27).
23. LINE, M.B. Document delivery, now and in the future. *Aslib Proceedings*, **35**(4), 1983, 167–176.
24. WHITE, B. Factors affecting document delivery systems: present and future. *In: Proceedings of the 5th International Online Information Meeting.* Oxford: Learned Information, 1981, 337–346.
25. EMSLEY, J. *and* JENKINS, C. A question of bookkeeping. *Times Higher Education Supplement.* No. 589, 17 February 1984, 16
26. MARTYN *and* SINGLETON, *op. cit.*, 14.
27. OAKESHOTT, P. *The impact of the new technology on the publication chain.* London: BNB Research Fund Report no.11, 1983.
28. MARTYN *and* SINGLETON, *op. cit.*14–15.

29. *Information Hotline*, **14**(3), 1982, 1.
30. Cited in *Monitor*, **3** (May), 1981, 1–2.
31. LINK. Document delivery: research memorandum. *ORM*, **1**(6) 1980.
32. *Ibid.*, 12–16.
33. GILLESPIE, P.D., *et al. Final report: problems of document delivery for the EURONET user*. Munich: Franklin Institute, 1978.
34. BULL, G.E. Document delivery services and copyright, *Aslib Proceedings*, **35**(4), 1983, 183–194.
35. LINK, *op. cit.*, 9–10.
36. DAVIES, J. The case for copyright. *Aslib Proceedings*, **34**(2), 1982, 129–132.
37. *Monitor*, **28** (June), 1983, 3–4.
38. *Monitor*, **25** (March), 1983, 1–2.
39. MAXWELL, R. Data retrieval systems and international publishing. *Aslib Proceedings*, **34**(1), 1982, 38–45.
40. STIRLING, J.F. Technological developments in information transfer: some implications for academic libraries. *Journal of Librarianship*, **14**(4), 1982, 235–246.
41. LINE (ref. 23) *op. cit.*
42. *Ibid.*, 175.
43. RUSSON, D. The impact of new technology on present document delivery systems. *Electronic Publishing Review*, **2**(2), 1982, 131–136.
44. WHITE, *op. cit.*, 343.
45. LINE (ref. 22), *op. cit.*, 7.
46. ESTABROOK, L. Library as a socialist institution in a capitalist environment. *In:* VARLEJS, J. *ed. The economics of information*. London: McFarland, 1982, 3–116.
47. *Monitor*, **18** (August), 1982, 4–7.
48. *Monitor*, **10** (December), 1981, 4–7.
49. LINE, M.B. The future of libraries in the information transfer chain. *Information Services and Use*, **3**(3), 1983, 129–140.
50. *Ibid.*
51. ESTABROOK, *op. cit.*, 13.
52. WHITE, L. The sensible economist's guide to the economics of information. *In:* VARLEJS, J. *ed. The economics of information*. London: McFarland, 1982. 17–29.
53. BECKER, J. The changing electronic information environment. *Information Services and Use*, **3**(3), 1983, 121–127.
54. PRINTING INDUSTRY RESEARCH ASSOCIATION. *Electronic document delivery: a study of the relationship between user needs and technology options*. Leatherhead: IEPRC, 1982.
55. *Ibid.*, vol. 1. B58.
56. SCHILLER, H.I. *Who knows: information in the age of the Fortune 500*. Norwood, N.J.: Ablex, 1981, 73, 55.
57. DIZARD, W.P. *The coming information age: an overview of technology, economics and politics*. London: Longmans, 1982, 139.
58. KASPUTYS, J.E. Private and public sector responsibility for the collection, distribution and analysis of statistical data. *IASSIST Newsletter*, **4**(3/4), 1980, 69–72.
59. MOREHEAD, J. Some reflections on user needs and the information transfer process. *In: Scholars' access to information: public responsibility/private initiative. Minutes of the Ninety-Ninth Meeting of the Association of Research Libraries, October 29–30, 1981*. Washington, D.C.: ARL, 1982, 2–11.
60. LINE (ref. 49), *op. cit.*, 17.
61. DIZARD, *op. cit.*, 140.
62. LINE, M.B. Libraries and information services in post-technological society. *Journal of Library Automation*, **14**(4), 1981, 252–267.

63. BRANSCOMB, A. Beyond deregulation: designing the information infrastructure. *The Information Society*, **1**(3), 1982, 167–190.
64. VAN ROSENDAAL, C.J. European information policy situation. *Aslib Proceedings*, **36**(1), 1984, 15–23.

Researchers, Policymakers, Planners:

In the current economic climate it is perhaps more important than ever before to keep abreast of developments and be aware of work carried out by others in YOUR field.

A significant and increasing proportion of the information will be found in what is termed "grey literature" – best defined as literature which cannot readily be acquired through normal bookselling channels, e.g. Report literature, discussion and policy documents, working papers, conference papers, theses, some official publications, local government publications, etc.

To alleviate the considerable problems of acquisition, bibliographic control and access to grey literature, **a System for Information on Grey Literature in Europe, (SIGLE)** was set up with CEC support. The main aim of the system is to provide access to documents and incidentally to improve bibliographic coverage. It combines the resources offered by important national information/document supply centres in a number of European Community countries. **SIGLE** also seeks to encourage producers of grey literature to supply their documents to their own national centre.

An eight page booklet with full details of **SIGLE** including a list of national centres can be obtained free of charge by completing the reply coupon below and posting to:

SIGLE Officer, British Library Lending Division,
Boston Spa, Wetherby, West Yorkshire. LS23 7BQ.

Send now, for your Free SIGLE Booklet

Name ....
Job Title ....
Company/Organisation ....
Address ....

AP

System for Information on SIGLE Grey Literature in Europe

International Specialist Course

Library Resources in Higher Education

24 March - 4 April 1985 in London

As the world moves into the Information Age libraries in higher education are called upon to play an increasingly important role both in providing the resource materials and in educating students in their use. This requires that senior librarians should not only be well able to manage the many and varied types of resource media, but should also recognise the need for regarding the national library and information services as one integrated system. This course is aimed at senior librarians faced with difficult problems and decisions.

The course will be jointly directed by **D J Foskett OBE**, formerly of the University of London Library and **D T Lewis** of Sheffield City Polytechnic.

Qualifications of members
Members should have some years of senior management experience in university and other types of library serving higher education. The course will also be appropriate for government officers with responsibilities for library provision and planning.

There are vacancies for 30 members.

Fee: £595 (Residential).

Venue and Accommodation
The course sessions will be held in the Durning-Lawrence Library, University of London. Residential course members will be accommodated at John Adams Hall, one of the halls of residence of the university, within easy walking distance of the Durning-Lawrence Library.

Applicants are advised to apply before 4 December 1984.

Further information and application forms for this, and other British Council specialist courses, can be obtained from your local British Council office or from the
Director
Courses Department
The British Council
65 Davies Street
London W1Y 2AA

The
British
Council

Using commercial databases online

Sylvia P. Webb

Head of Business Information,
Stoy Hayward & Co., London

Paper presented at the Industrial Market Research Association (IMRA) Annual Conference, in Bristol, May 1984.

Introduction

To talk about the information explosion is certainly old-hat. Even to talk about information technology is to use a well-worn phrase.

1982 was Information Technology Year, to which the response of some has been that it passed by without them being aware of it, or that the emphasis was all on the technology and not on information. Yet information is vital to business and is today being produced in a wide range of format, one of which increasing use is made being the online service.

There will be those of you reading this who are already experienced online users, others who are just beginning to use such services, whilst some of you may be at the pre-start stage, wanting to find out what is available and what potential use it has for your organisation.

What is online?

What is an online service and how does it differ from other information services? What relevance does it have for industrial marketing and management decisions in general? What does online offer that is not available elsewhere? Does it replace the traditional source of information or is it complementary?

To answer such questions, it is necessary to discuss the different databases available; how to trace them and find out more about them, and to consider how and when to use them, what they provide in terms of data, how to evaluate them, the implications for staff training and the types of cost involved.

For the purposes of this paper we are going to concentrate on commercial online databases, that is, those externally-created databases which can be bought either on a subscription or a pay-as-you-use basis.

You may have already built up your own internal collection of information and stored it on a computer. This could include, for example, the results of market research which has been carried out and may be required for future planning, as well as various internally-generated data. So the next natural step could be to look at external sources of information.

Aslib Proceedings **36** (10), October 1984, pp. 393–400. Printed in Great Britain.

What is meant by an online database? To put it simply, it is a collection of information, stored in a computer file and immediately available, being accessed by a telecommunications link, either directly, as in the case of TEXTLINE or DATASTREAM, or via a host computer. Examples of such hosts are Dialog, Data-Star, SIA, all of whom provide retrieval facilities to a number of different databases.

The observable equipment consists of a keyboard, through which instructions are given, a visual display unit (VDU), on which the information which is being retrieved is displayed, and a printer, allowing the facility to print information after it has been displayed and selection has been made.

Offline searching is where the search does not take place immediately but is carried out at a later stage, making use of off-peak telephone time which can result in a considerable saving on cost. Whilst this facility is useful where information is not required immediately, it is not the most appropriate means of searching in a business environment where the emphasis is usually on 'instant' information.

Online services, of course, include those which appear under the generic heading of viewdata, such as Prestel. It is important to emphasise that viewdata, with a small *v*, is just the format in which information is supplied. Originally it was intended that the service now known as Prestel would be called Viewdata, with a capital *V*, but the term is now used in a much wider sense. Today there is increasing use of private viewdata systems designed to facilitate the interchange of information between various offices, as in the case of stockbrokers, or for companies with a national network of dealers, e.g. British Leyland, which uses it as a means of stock location. These are known as closed systems.

Advice and training

But to return to those online services which are open to all users; how can you find out about them? Where do you go for advice and assistance? How can you establish that any online databases exist which will meet your particular requirements and, if they do, how do they compare with alternative sources of information?

There are a number of approaches; the first of which may be an informal one, such as talking to those individuals who are already using online services in other organisations, arranging to visit their information centres if this is possible, and talking over the possible pitfalls and problems as well as the benefits.

Read some introductory material; *Going online 1984*[1] is especially helpful. It is particularly important that those staff involved in online searching should receive appropriate training and have available the means to keep themselves up to date with new developments. These will be mentioned in specialist journals, e.g. *Online Notes, Online Review, Chronolog*; others, such as *Aslib Information* or *Library & Information News*, and of course the general press, particularly the marketing, management and technology pages of the *Financial Times* and the *Times.*

There are a number of short courses available which provide an introduction to online, some organised in conjunction with a particular online service, others independently by such organisaions as Aslib, the Central Information Services of the University of London, and the UK Online User Group. There is also a useful video programme to help with such staff training entitled *Online Business Information*[2].

The producers of databases are only too happy to demonstrate their products and provide you with initial literature. Free trials of some services may be available to the libraries and information centres of certain types of organisation. Such trials have the great advantage of offering the facility to test a service to its full potential with real enquiries in your own daily working environment with its particular information demands and requirements. This approach could be incorporated into a short-term limited-budget project, whereby a number of services could be tested and evaluated in-house, again in response to genuine, current information needs.

When a new database is launched, there will often be a half-day or one-day seminar with demonstrations of the new product. These are usually announced well in advance in the journals already mentioned and are valuable in that not only do they provide the opportunity to meet the experts and find out in detail what is on offer, but they also offer the possibility of putting forward your particular information requirements, which may be considered by commercial database producers in future updating of the product or in the development of new services.

Consult the specialists. For example the Online Information Centre in London offers an independent advice service on all aspects of online use. Initial help is free, and for a very modest sum (£24 in 1984) per year, subscribers to the Centre have unlimited access to expert advice as well as receiving a regular newsletter, *Online Notes*, giving details of new services, user groups, conferences, courses and publications. Look through the various directories of databases held by the Centre; see which services would be most helpful to you and discuss them with the experts on hand.

An alternative way of finding out about online services is to call in an information consultant, who can be located through professional organisations such as the Library Association, Aslib (the Association for Information Management), or through advertisements in various publications. This would, of course, be on a fee-paying basis.

Having carried out initial research and before rushing out to buy up the stocks of your local computer supplier, you need to ask yourself whether it is appropriate in this early stage to set up online services in-house or whether to have some initial searches carried out using external facilities, where the only costs involved will be the charge for each search. For example, the Aslib Online Searching Service charges its members only the direct cost of the search. Non-members pay an additional handling charge of £25, but even so, this is a lot cheaper than buying equipment and various user aids before knowing exactly what is needed. Other organisations who will search on your behalf are listed in *UK online search services*[3].

Databases: types and content

What sort of information do the databases provide that would be useful to your particular business? As you will see if you look at any of the directories listing the various databases, they cover an enormous range of subjects, from agriculture to art, textiles to toxicology, and somewhere in between you will find management, marketing and economics.

There are two main types of database. One is the bibliographic database; that is, a collection of information from the literature of a particular subject—for example, material from journal and newspaper articles, reports and conference proceedings, which may be produced in full-text or abstract form. Then there is the non-bibliographic database; that is, one which presents information in statistical or numeric form.

DATASTREAM is a non-bibliographic database giving detailed statistical information on companies and industries, including profit-and-loss accounts, balance sheets, key accounting ratios, UK and overseas stock trading, as well as a wide range of international economic data. It also allows manipulation of certain data to achieve a particular piece of information, e.g. the P/E (price/earnings) ratio of a company. It is extremely comprehensive and, as such, requires the user to spend a considerable amount of time becoming familiar with the programs in order to get maximum benefit from its range of services.

TEXTLINE on the other hand is, for the most part, a bibliographic database concerned with the printed word, giving access to company information as presented in the international press. Although best-known for its press coverage, TEXTLINE has recently introduced a service called DATALINE which presents financial information, for example company accounts. There is, however, no interactive facility for data manipulation. Two features particularly worth noting about TEXTLINE are its ease of use and speed of response. An advantage of both DATASTREAM and TEXTLINE, in contrast to a number of other online services, is that they are truly current, being updated daily.

Other bibliographic databases of relevance to business include ABI/INFORM, ECONOMIC ABSTRACTS INTERNATIONAL, MANAGEMENT CONTENTS, PIRA MANAGEMENT AND MARKETING ABSTRACTS, and the PREDICASTS series, the last also containing some statistical material. *Key British Enterprises*, a well-known directory giving information on companies and their directors, has this year gone online as KBE ONLINE. In addition there is a wide range of non-bibliographic, i.e. statistical or numeric, databases. These are often called databanks and cover financial and economic information. The Central Statistical Office, for example, has government statistics available online through SIA, which is also the host for COMEXT, the databank covering trade statistics of the European Community, as well as hosting a number of other statistical series. Those mentioned are but a few of the ever-increasing number of information services becoming available online, most of which are listed either in Cuadra Associates' *Directory of online databases*[4] or Aslib's *Online bibliographic databases*[5].

Evaluation

In order to evaluate a database fully, it is necessary to draw up a list of criteria. These will include coverage, i.e. the breadth and depth of coverage of the subject; the sources used; the period of time covered; whether the material has a bias towards one country or is international; the relevance of the search output which will relate to the way in which the material has been indexed (i.e. is it detailed enough to offer specific information?); the currency of material (is it up to date?); possible overlap with other databases and/or alternative sources of information; the speed of response and the ease of use. An excellent evaluative publication is *Which database?*[6], itself regularly updated, and its companion volume *Which databank?*[7].

I would suggest that all the criteria mentioned provide indicators of the suitability and therefore cost-effectiveness of online for your organisation. Cost-effectiveness does not relate only to the bill which comes in at the end of the month for the services used. It also relates to the effective use of staff resources, the time that will be spent not only online but also setting up the search, so that the output of the search meets the requirements of the enquirer. The relevance and completeness of the material that comes out of a search will dictate whether any further searching is required and whether in fact any additional knowledge of information has been gained.

The importance of the search strategy

Cost-effectiveness can only be achieved by ensuring that the staff using the online service have received some formal training, particularly in the development of a search strategy, by which I do not mean becoming familiar with the technicalities of searching (or which keys to press), but rather developing the ability to interpret what information is required from the question originally asked and how best to structure the search. This will involve such considerations as whether the question is specific or has been couched in general terms and whether the database will be searched by the person seeking the information or through an intermediary. If the latter, it is good practice to discuss the end purpose of the search with the originator of the question, before establishing specific keywords or terms which may be used singly or in combination to structure the search. Such structuring of a search means that when it does take place, the information retrieved from the database will be as closely related as is possible to the enquirer's needs.

The next step is to select the most appropriate database from the detailed descriptions available in the various user aids available. Having selected the database to be searched, attention must be given to the command language in use, i.e. the format for instructions and whether searching is by free (or natural) language terms, or by the use of various mnemonics or codes. For example, TEXTLINE has a list of the 50,000 companies it covers, with a short mnemonic or code which represents each company's name. This saves a lot of time in that the name does not have to be typed in full when a search is carried out. TEXTLINE also uses codes in number form to identify a particular topic, e.g. 131 = home markets, sales and imports; 132 = exports and overseas markets; 133 = advertising and promotion. Other databases provide various indexes or thesauri listing preferred terms, as well as subject classifications which may have been developed for a particular service.

A further consideration is the period of time to be covered by the information, which can be achieved by combining a date limit into the command sequence. It should be emphasised that all these preliminary tasks are carried out *before* you even dial in to the service. It would be very costly, time-consuming and frustrating to try to carry them out whilst online. Apart from the need to achieve cost-effectiveness, a search strategy is vital in order to avoid ambiguity and to ensure that the most appropriate type of search is carried out.

Costs

The cost involved varies from database to database. Those available through Dialog or Data-Star are charged on a pay-as-you-use basis according to the type of contract entered into. There is no initial charge. Training is available and a user number is allocated. You are then ready to search online. Of course there will be certain essential costs, such as buying the user guides and manuals that relate to the services, without which you would not be able to either select a database or have the appropriate commands to use it. The current cost of *The guide to Dialog searching* is $75, which covers command sequences and comprehensive descriptions of all the databases. The Data-Star user manual costs 50Sw.fr. and subject manuals are available at an additional cost for each main area covered, e.g. the manual for business databases costs a further 50Sw.fr.

TEXTLINE is available on a subscription basis. Currently the basic cost is £6,500 per year, which includes the equipment and the user manuals. Additional services require further payment.

DATASTREAM offers both methods of payment, that is an annual subscription for its comprehensive service, or a pay-as-you-use facility combined with a nominal charge per month.

All the services available through Dialog in fact show the cost for each search on the print-out, so that you are kept aware of how much you are spending on a day-to-day basis.

The cost of using the Prestel service includes buying or renting a suitably adapted television set, a subscription for the Prestel line, time online, the varying costs of each page of information accessed, plus normal telephone charges. Prestel can also be used in conjunction with a microcomputer via Micronet.

Conclusion

As you can see, there is a great variation in the costs and the payment method, as well as the range of information available. But can any information resource be looked at purely in terms of money or its physical format? When information is required, the most appropriate source must be approached in order to obtain it. This may sometimes be an online database or could be a journal, a newspaper or other information produced in printed form, such as card services and loose-leaf books, both regularly updated. The various criteria for the evaluation of databases mentioned earlier will be the basis for your decision as to whether online or another resource should be used, and each information request should merit individual consideration. Commercial online databases must therefore be used in situations where the choice and use of a database is the most appropriate means of obtaining or disseminating particular information. They are becoming increasingly important sources of business information, but they must still be seen as only part of the total range of information resources available today. All the databases at present in existence are not yet even in combination, able to answer every question that you may wish to ask.

REFERENCES

Books

1. *Going online 1984*. London: Online Information Centre, 1984.
2. *Online business information*. Hartlepool: Impact Video, 1984.
3. DEUNETTE, J. *UK online search services*. London: Aslib, 1982.
4. CUADRA ASSOCIATES *et al*. *Directory of online databases*. Cuadra Associates, Santa Monica, published twice a year on subscription.
5. *Online bibliographic databases*. London: Aslib, 1983.
6. FOSTER, A. *Which database?* Hartlepool: Headland Press, 1981 (update 1982/83).
7. FOSTER, A. *Which databank?* Hartlepool: Headland Press, 1984.

Journals

Aslib Information. London: Aslib.
Chronolog. California: Dialog Information Services Inc.
Library & Information News. Reading: Alan Armstrong and Associates.
Online Notes. London: Online Information Centre.
Online Review. Oxford: Learned Information.

Organisations to approach for further information

Aslib Online Searching Service
Information House,
26/27 Boswell Street
London WC1N 3JZ
Tel: (01) 430-2671

Central Information Services
University of London
Senate House
Malet Street
London WC1
Tel: (01) 636-8000

Data-Star
Willoughby Road
Bracknell
Berks RG1 24DW
Tel: (0344) 489151

Datastream
Monmouth House
58–64 City Road
London EC1Y 2AL
Tel: (01) 250 3000

Dialog Information Services Inc
PO Box 8
Abingdon
Oxon OX13 6EG
Tel: (0865) 730969

Library Association
7 Ridgmount Street
London WC1E 7AE
Tel: (01) 636 7543

Online Information Centre
Information House,
26/27 Boswell Street
London WC1
Tel: (01) 430 2671

Prestel
Telephone House
Temple Avenue
London EC4
Tel: (01) 583 9811

SIA Computer Services
Ebury Gate
23 Lower Belgrave Street
London SW1W 0NW
Tel: (01) 730-4544

Textline
Finsbury Data Services Ltd
68/74 Carter Lane
London EC4V 5EA
Tel: (01) 248-9828

Improving your image: how to promote a library or information service

Douglas Wood

Marketing Manager, Aslib

The object of this paper is to help library and information staff to promote themselves and their services, so that they present an efficient and capable image of their work. The paper brings together some straightforward ideas and practical marketing methods which can be used in the library and information field.

Mention the word 'marketing' to information staff and you are likely to meet a number of reactions. Some regard it with a mixture of curiosity and fascination, thinking it very glamorous in the Saatchi & Saatchi image. Some regard it with confusion. Marketing may be all very well for a detergent manufacturer, but what has it to do with day-to-day work in an information centre? And some, I think regrettably, regard the whole subject as distasteful, rejecting it as 'tainted' with a commercial tinge, the kind of thing they hoped to escape from when they became librarians.

Yet marketing methods, if applied appropriately, can make a vital contribution to library and information work. Many libraries and information centres are under threat of contraction or closure and their staff find that they need to justify their existence to their employers and colleagues. Librarians must be able to counteract the criticism that they are a financial burden to their organisation. They need to campaign to gain financial support, to promote themselves.

Marketing can help librarians and information staff to upgrade their reputation, both within their organisations and as a profession within society. One of the great weaknesses of the traditional librarian is that he or she is too cautious, not nearly self-assertive enough. Librarians are often naive when it comes to the internal politics of the organisations where they work. They need to become more sensitive to how their organisations are managed, and in particular who controls the purse strings. And they must use good public relations methods to ensure that their case is heard and represented.

Part of the problem is that managers on the whole tend not to appreciate quite what it is that information staff do, or indeed why an efficient information service is important. Information workers need to educate their bosses and colleagues, to impress upon them why information is a vital business resource. Some managers of course, in industrial sectors such as electronics or pharmaceuticals, do realise that good information is the lifeblood of their organisations. For them it is essential to monitor patents, technological advances and market developments. In other organisations however, managers

Aslib Proceedings, **36**(10), October 1984, p. 401–408. Printed in Great Britain.

are often bibliographic illiterates, who have been trained to act rather than read, and who often do not even know where their company's library is.

One of the benefits of the recent rapid changes in information technology is that government and business have been made aware of the potential of efficient information management. This is something upon which library and information workers should capitalise. It seems a great shame that many managers are learning about the possibilities of the electronic information revolution at home through their children's personal computers, when at work they are ignoring their library and information staff who have been developing efficient information-handling techniques, and using information technology, for some years.

Many information workers are now aware of the need for better promotion of their work, and this paper describes some of the methods which can be used. First of all, however, it is useful to put promotion into its context in the marketing field, for the simple reason that if you do not know what it is you are promoting, you cannot promote it effectively.

How can we define marketing? One of the reasons that the whole subject is so offputting to information staff is that marketing textbooks are difficult and tedious to read and their definitions are too theoretical and inappropriate to library work[1]. Yet the basic concepts of marketing are simple and practical. The working definition which I prefer is:

The role of marketing is to match your capabilities with the needs of your customers, so that they respond by taking action profitable to you.

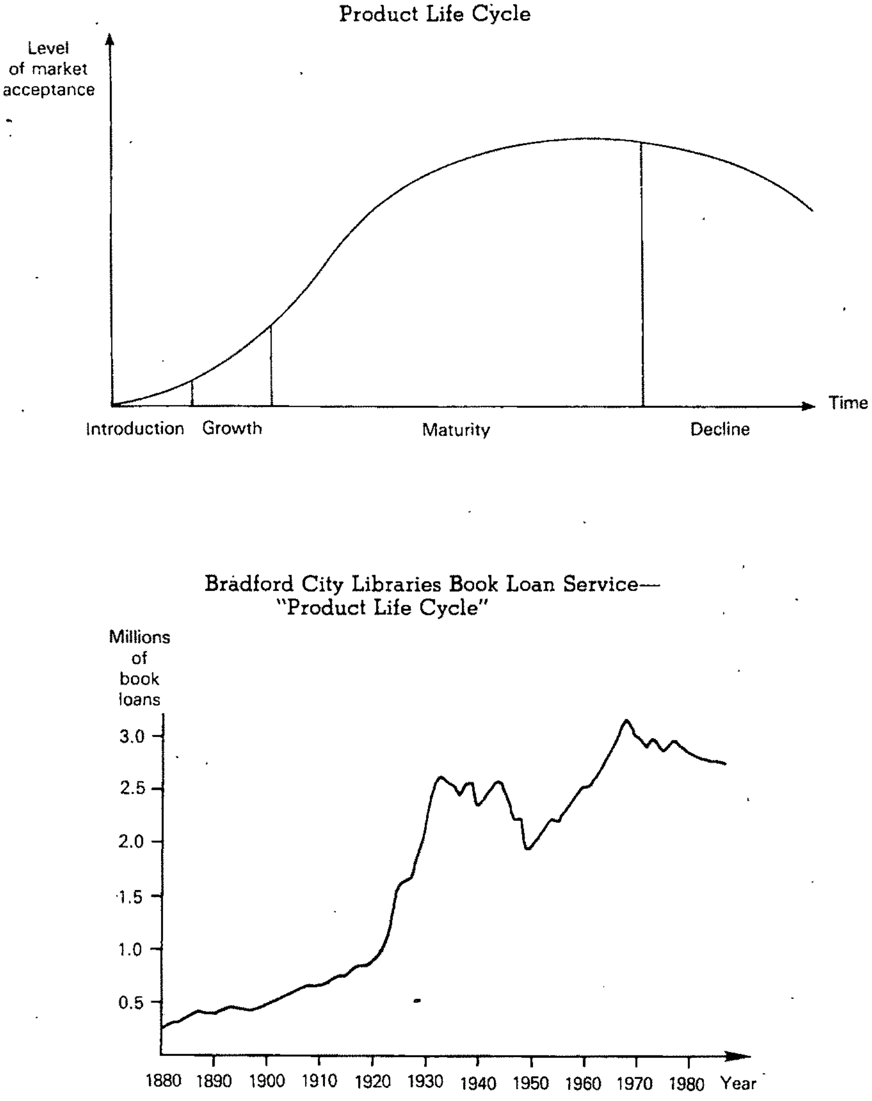
Marketing is more than just selling, although selling is, I believe, an important element. In classic theory it covers the four *P*s:

Promotion;
Product (or service);
Place (where you promote);
Price (or profit).

Price is of course a problem for many information workers, since the profession has an established tradition that information is free. It is, however, free only in the sense that the office photocopier is free. It does not come out of your budget, so it appears to cost nothing. Although it is heresy to many librarians brought up in the traditional mould, I believe that, wherever possible, information services should be charged for. Giving something a price also endows it with value.

The great strength of marketing is that it offers a disciplined approach, which enables us to stand back from our everyday tasks and gain an overall perspective of our work. It can help diagnose problems and offer some remedies. Above all it can help us plan for the future.

In any marketing review, it is essential to understand what business you are in. Librarians are not simply in the book supply business, although this is how they are often perceived by others, and sometimes even by themselves. Librarians are in a much wider field, which for want of a better word can be described as the 'communications' business.



Source: Bradford City Libraries data

FIG. 1 *Comparison of the Bradford City Libraries book loans with the classic 'Product Life Cycle'.*

The most important aspect of any promotion is personal contact with your users. You will almost certainly have visited your users to ascertain their needs. If you are to convince them that your services are worthwhile and explain any new activities you are launching, the more time you can spend meeting them face to face the better. It is enormously helpful if you can think yourself into a frame of mind where you identify yourself with your users and are considered as one of them rather than as an isolated individual who sometimes lends them books. Librarians suffer from being cut off from their users and this can be a major factor in their failure to defend themselves against budget reductions or even closure.

When planning a promotional campaign, start off by considering your users' needs, rather than trying to publicise the service you are currently offering. Sell the benefits of your products, rather than products themselves. Your users want to know how your services can help them. They may have no interest whatsoever in the technical specification of an online database or in your library's classification system. Using your library's service may be likened to taking a car to a garage to be repaired. As long as your users receive high quality service, they are unlikely to be interested in knowing exactly how the work is done.

Make sure that your own staff know what is going on. Your promotional efforts are likely to result in enquirers coming to the library or telephoning for advice. If they are met with blank incomprehension from your colleagues, this can severely damage your credibility.

Pace yourself. There is little point in launching a campaign which sets off like a rocket and then fizzles out after a week or so. Apart from anything else, you may face resistance from your employer when you try to resurrect the idea of a promotional campaign at a later date.

Collect whatever statistics you can on the effectiveness of your campaign, in particular any increased demand for your services. If nothing else, they will be useful evidence to impress your boss. Monitor the results during the campaign and for several months afterwards.

Above all, choose what is appropriate for your users and organisation. Do not flood your users with information they do not want. Ask them what they need, rather than sending them what you think would be good for them. Develop a campaign which enhances the quality of your service. Do not try and sell it as if it were toothpaste, or you will risk being written off as superficial. Make sure that you are in a position to deliver on any promises you make, so that your promotional efforts do not result in disappointment to your users.

The best publicity that you can have is a satisfied customer. If you offer a reliable and respected reference service, word of mouth will quickly spread your reputation.

Effective promotion requires good quality presentation. Small details, such as the way you package the information you send to your colleagues, can make a big impact. If for instance you are asked to compile data in response to an enquiry, organise the material in a logical or chronological order. Place it in a binder or inside a plastic cover. If possible develop your own standard information kit and mark the cover clearly with words such as 'Prepared By The Information Centre', so that it will be quite clear who has done the work.

One of the most effective ways of promoting your service is by producing a descriptive brochure. Such a brochure should be as brief as possible, with a clear visual and verbal image. Use good quality print and attractive colours, and incorporate any relevant logos or symbols which your organisation has. You might even like to develop your own logo or library 'house style'. In your brochure avoid complexity, jargon and acronyms with which your users may be unfamiliar. Make sure that the brochure includes a list of your services and the names and telephone extension numbers of any contacts. Ensure that the brochure looks neither too cheap nor too expensive. It must be smart enough to impress your boss—and the boss's secretary, who may otherwise throw it out before the boss ever gets a chance to see it. If it looks extravagant, however, you run the risk of being criticised for wasting money.

A brochure can be produced in many different forms. If you are looking for ideas, the Aslib Information Centre has an extensive collection of library brochures which can be loaned to Aslib members.

Apart from preparing a brochure, you may wish to produce an introductory guide to your services, an occasional newsletter or awareness bulletin giving details of your library's acquisitions. You could prepare an industry guide, describing the various information sources available. If you do so, make sure you include a glossary of technical terms, a contents page and an index. If your organisation has a brochure describing its various activities, make sure that your library is clearly included in it. If you have a house magazine, why not write an article on some aspect of your service, making sure you emphasise the human interest element.

Posters can be very effective. Good placement is vital. Ensure that you put them in areas where they can be clearly seen, such as next to reference desks or on departmental bulletin boards. Information flashes—A4 signs on notice-boards in shocking colours—can be eye-catching, in particular if they are headed with bold questions starting with phrases such as 'Did you know. . .?' or 'Have you heard. . .?'

Other promotions you may wish to consider are demonstrations and slide shows. Exhibitions too can attract attention to your services, and can be built around such themes as your company's products, a historical collection or progress on a new building. If possible, ensure that the exhibition is held in a public area such as your organisation's reception rather than in the library itself where it will only be seen by your existing customers.

Does your organisation have an internal telephone directory? If so, check that your library services are clearly mentioned, and names and extension numbers given. If you work on a large site, ensure that your library is clearly sign-posted. If your organisation has an induction programme for new staff, arrange for the library to be included, so that you have the chance to explain to all newcomers how your library can help them.

In this paper I have described how marketing ideas can help the librarian review his or her services and ensure that they meet the needs of the library's users and of the organisation as a whole. I have also depicted some of the

The key to any marketing analysis is to *examine your users' needs*, rather than evaluating the services and products you are currently offering.

There are three ways in which you can look at library and information work, and it is useful to distinguish them. You can analyse your work from the point of view of the organisation, your users and the services you offer.

1. *The Organisation*

The company or organisation you work for has corporate objectives and it is important that your library or information service fits in with them. Is your organisation primarily profit-orientated, for instance? If not, does it have social or philanthropic goals?

What is your role within the organisation? Is it changing?

Are there others within the organisation who can do some things better than you can? Can some end-users access information sources themselves? Is there unnecessary duplication between your work and that of other information units in your oganisation? Can the EDP department take over any of your functions?

What useful tasks could you do which you are not currently doing? Which areas of the business are growing and are therefore likely to have both information needs and the budget to investigate them? Which areas are dying and will, if axed, seriously affect your budget or scope?

Who are your competitors? What can you learn from other libraries and from the information industry as a whole? Even public libraries now face competition from the information services provided by local community advice bureaux, etc.

2. *Your users—and your boss*

Who are your customers? Information workers are unusual in that they have to satisfy both their employers and the users of their services.

It is important to gain the support of your organisation's management, at the highest possible level. If senior management are committed to something, the chances are that others will follow. Make sure that your boss is informed of your activities, in an appropriate way. If for instance you are announcing the introduction of a new database, make sure that your boss as a courtesy receives a copy of the memo you send to your users.

Who are your users? In many businesses the 80/20 rule applies. In other words 80 per cent of what a company sells is purchased by only 20 per cent of its customers. Are you dependent on too few individuals or departments?

Try to segment your users into different categories, identifying the most important and the most influential. Are there others who could use your services? Would they be prepared to pay for any assistance you give them?

What do your customers use you for? What benefits do you offer them? Can you present your services more effectively?

Above all, recognise that the success of your library depends primarily on how your employer and users view your work. If you are planning to introduce new services make sure that you gain the support of as many users as possible, but bear in mind that most people are slow to accept change. There is a theory proposed by Everett M. Rogers, called the diffusion of innovations. According to Rogers when a new product or service is launched it is normally taken up quickly by only a small percentage—perhaps 16 per cent—of its total potential market. The key is therefore to identify those who are innovative enough to welcome and champion your new services. Once you have their support, others will probably follow.

3. *Your Services*

Which of the services you provide are the most needed? Can you rank them in order of priority? Can you improve your services by offering a faster response to enquiries or by distributing the results in a more convenient form? Are you currently charging for your services? If not, have you considered whether some of your users would be prepared to pay?

What new services could you offer? Do not expand your activities just for the sake of it. More is not necessarily better. Just doubling the number of online searches you carry out, for instance, does not automatically mean that your service becomes twice as efficient as before, unless the information you supply helps your users' needs. The easiest and most effective way of promoting a new service is to develop it in such a way that it will sell itself. It is most likely to do so if the service you are introducing offers speed, accuracy and is available at a lower cost than alternative sources.

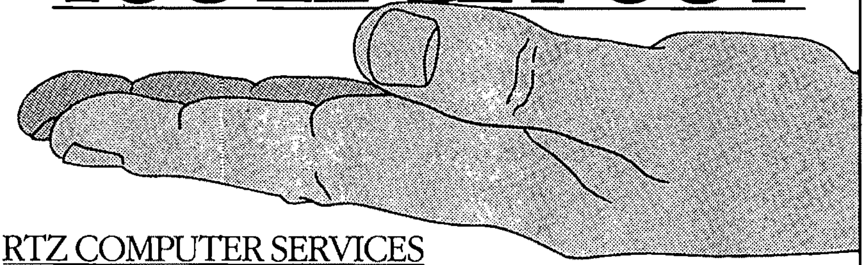
Another useful way of assessing your services is to identify why they are used less than they could be. Are other sources more convenient? Are potential users unaware of your library's facilities and how you might help them? Do they not realise that they have an information problem? Have they had previous bad experiences with the library? Do they prefer talking to reading, and if so, should you not be visiting them rather than sending them information? Is your library inhospitable and are there not ways you could make it more attractive?

You are probably familiar with the theory of the 'product life cycle', in which the market for a new product initially grows rapidly, gradually reaches maturity and then declines. You may not feel that such a concept is applicable to your own activities, but in Fig. 1, reproduced from his interesting and very useful book on marketing strategies for libraries, Barry B. Smith[2] shows that in the case of one hundred years of the book loan service offered by Bradford City Library, elements of a classic product life cycle can be seen. The graph indicates two periods of rapid growth, in the 1920s, and between the 1950s and late 1960s, after which demand for the service has dropped. What of the future? Will book-lending be displaced by competing services such as video or computer software supply?

The important point to bear in mind is that the market for any service inevitably changes and in some cases disappears. Are you perhaps continuing to order serials and replace directories and technical books out of habit rather than because a demand for them still exists?

Once you have carried out an assessment of your organisation, users and services, and decided what aspects of your work you wish to promote, then you can establish a promotional campaign.

THE MORE WE PUT IN, THE MORE YOU'LL GET OUT



RTZ COMPUTER SERVICES INTRODUCES MicroCAIRS ....IN A TOTAL SUPPORT PACKAGE.

RTZ Computer Services are now offering you MicroCAIRS, a powerful new system for the entry, indexing, storage and retrieval of textual or numerical information. Written by information specialists, for information specialists.

Here's what MicroCAIRS can give you:

☐ Power and flexibility on a microcomputer – high speed Boolean searches on over 10,000 records and total user definition of database structure.
☐ A choice of controlled or free language indexing.
☐ Inverted keyterm or textual searching with full SDI facilities.
☐ An optional Thesaurus to aid indexing and searching.
☐ Sophisticated multi-level security to protect information and the system.
☐ Upwards compatibility and portability to larger multi-user minicomputers.

And here's why you should buy MicroCAIRS from RTZ Computer Services:

1 We help get you started so that you can use MicroCAIRS to its fullest capacity. We provide full installation help and start-up support – designed for you. And we can offer you advice over the phone – direct from our Information Specialists.

2 We train you properly, giving you (free) an intensive two day course to help you get the most from MicroCAIRS (since we've been working with the well proven CAIRS system for 3 years, we know what we're talking about...)

3 We have the experience to help you. RTZ Computer Services have been supporting management software in a wide range of applications since 1970.

4 RTZ Computer Services is a member of the Rio Tinto-Zinc Corporation, one of the UK's most successful commercial organisations. This assures our long term committment to you and your MicroCAIRS system.

MicroCAIRS from RTZ Computer Services has infinite possibilities for today's information managers. Establish its real potential for yourself.

RING LESLEY YOUNG ALA
OR JOHN CATO AMBCS ON
BRISTOL (0272) 24181 TODAY.
OR WRITE TO RTZ COMPUTER
SERVICES LTD., 1 REDCLIFF
STREET, BRISTOL, BS99 7JS.

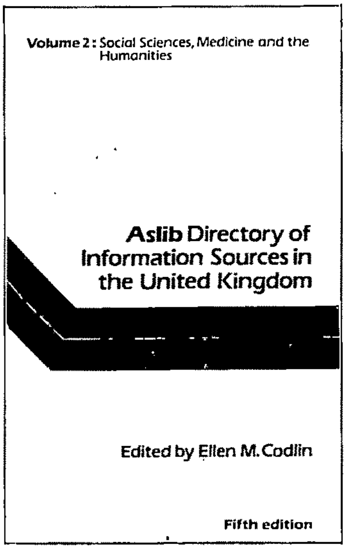
MicroCAIRS

another information management product from
RTZ COMPUTER SERVICES

Aslib Directory of Information Sources in the United Kingdom

Volume 2 : Social Sciences, Medicine and the Humanities

Edited by Ellen M. Codlin



Volume 2 : Social Sciences, Medicine and the Humanities

Aslib Directory of Information Sources in the United Kingdom

Edited by Ellen M. Codlin

Fifth edition

Fifth edition

- 5 NOV 1984

Lists over 3500 organisations which are able to make information available on the social sciences, medicine and the humanities. Copious references identify bodies who have changed their names or become amalgamated with others; an index of abbreviations and acronyms is also provided.

254 × 160mm 1984 1000pp
ISBN 0-85142-184-9
UK £60; overseas £70
£10 discount for Aslib members

From 28 September 1984, our new address will be 26/27 Boswell Street, London WC1